DOCUMENT RESUME

ED 448 581 EF 005 827

AUTHOR	Seals, Jack Reece, Jr.
TITLE	Recommendation of Standards for Educational Space for Public School Facilities.
PUB DATE	1991-05-00
NOTE	337p.; Ph.D. Dissertation, University of Texas at Austin.
PUB TYPE	Dissertations/Theses - Doctoral Dissertations (041)
EDRS PRICE	MF01/PC14 Plus Postage.
DESCRIPTORS	Administrators; Elementary Secondary Education; *Interior Space; *Public Schools; School Construction; School District Wealth; *School Space; *Standards; Surveys
IDENTIFIERS	*Texas

ABSTRACT

This study provides space standards for selected academic areas in order to guide Texas officials in their funding allocations during school construction. It examines the relationship between the recommendations of chief executive officers (CEOs) from school districts of differing levels of wealth and various enrollments as well as the relationships between the recommendations of the CEOs of school districts and recognized researchers in the field of educational facilities. The data indicate an absence of statistical differences between practitioners' perceptions of space adequacy regardless of school district wealth. Analysis further suggests that enrollment is not a major factor in the concept of educational space adequacy. Based on the findings, a recommendation of standards to guide the construction of educational facilities is provided. Appendices provide the survey population, copies of survey letters and the Commissioner's letter, and the survey form. (Contains 47 references.) (GR)

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RECOMMENDATION OF STANDARDS FOR EDUCATIONAL SPACE FOR PUBLIC SCHOOL FACILITIES

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RECOMMENDATION OF STANDARDS FOR EDUCATIONAL SPACE FOR PUBLIC SCHOOL FACILITIES

by

JACK REECE SEALS, JR., B.S., M.Ed.

DISSERTATION
Presented to the Faculty of the Graduate School of
The University of Texas at Austin
in Partial Fulfillment
of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY

THE UNIVERSITY OF TEXAS AT AUSTIN
May, 1991

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by

Jack R. Seals, Jr.

1991

This dissertation is dedicated to those whose love and support made successful completion possible:

My wife Nancy, who held the family together through the difficult times;

My daughter Jessica, who kept things in proper perspective;

My parents, Jack and Evelyn, who encouraged me to initiate this venture;

My in-laws, Joe and Joyce Quebe, who were always positive.

ACKNOWLEDGMENTS

The author gratefully acknowledges many individuals who have contributed to the completion of this study. My sincere thanks and appreciation go to:

Dr. Nolan Estes, for his guidance and support as committee chairman and director of the Cooperative Superintendency Program;

Dr. Walter Jordan-Davis, for his constructive assistance and encouragement;

Dr. Carl Candoli, Dr. Randy Parker, Dr. Jack King, Dr. Mike Thomas, and Dr. Dan Long for their encouragement and guidance as committee members.

RECOMMENDATION OF STANDARDS FOR EDUCATIONAL SPACE FOR PUBLIC SCHOOL FACILITIES

Publication No. _____

Jack Reece Seals, Jr., Ph.D.
The University of Texas at Austin, 1991

Supervising Professor: Nolan Estes

The recognition of inequity in state funding, sparked by the Edgewood v. Kirby law suite, includes the inequity dealing with adequate facilities. In an attempt to provide timely data for the State of Texas, this study reports research undertaken to determine standards of space for selected academic areas.

An extensive review of the literature provides background information regarding the importance of the facility as an educational tool.

This study examines the relationship between the recommendations of chief executive officers of school districts of below state average wealth and chief

executive officers of school districts of below average wealth. In addition the relationships between the recommendations of chief executive officers from school districts with various enrollments are examined.

Also examined are the relationships between the recommendations of the chief executive officers of school districts and recognized researchers in the field of educational facilities.

These examinations were made in an attempt to provide a standard by which to guide state expenditures for the construction of educational facilities in the state of Texas.

The results indicate that standards of adequacy are viewed similarly both by educational practitioners and educational researchers. With this knowledge and the input from practitioners and researchers, a recommendation of standards to guide the construction of educational facilities was made.

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RECOMMENDATION OF STANDARDS FOR EDUCATIONAL SPACE FOR PUBLIC SCHOOL FACILITIES

CHAPTER ONE

General Background

In the State of Texas there is great diversity in the quality of existing school facilities. There is diversity not only in the structural aspect, but in virtually every component of the school facility arena. There are school campuses such as Homer Hanna High School in the Brownsville Independent School District where over 50 percent of the student body attend classes in portable buildings (Austin American Statesman, October 2, 1989). There are campuses whose library facilities are comprised of books placed on a single board laid across two cinder blocks. By contrast, there are school districts that are wealthy enough to include swimming in their curriculum - held in their indoor pool.

This great diversity is a product of local wealth. Since the vast majority of school facilities are financed solely by local tax effort, the ability of a district to raise the necessary funds to provide adequate buildings depends upon circumstances which are uncontrollable by the school districts themselves. These circumstances center around the taxable value of the district's tax base. The taxable values of local school districts ranged, during the 1987-88 school year, from $21,979 per student in the Edcouch-

Elsa Independent School District to $5,404,050 per student in the Kenedy County Wide Independent School District. This great variation in local wealth imposes an educational inequity for school children across the state (Edgewood v. Kirby, 1987).

The adequacy of school facilities is a vital component of school climate. An effective learning atmosphere is supported by a safe, clean, and comfortable facility. Conversely, the lack of these components in a facility, therefore, detracts from the learning environment (Mace-Matluck, 1987).

Context of the Problem

Equity

Edgewood v. Kirby

Concerns regarding wealth inequities were addressed in 1987 by Judge Harley Clark in his decision on the Edgewood v. Kirby case. Judge Clark said that children's rights to attend school where the facilities were adequate enough to accommodate their needs should not be dependent solely upon the wealth of the school district in which their parents have chosen to live. He further spoke of the responsibility of the State of Texas to provide financial assistance to districts to ensure that facility inadequacies were addressed (Edgewood v. Kirby, 1987).

Judge Clark's decision was overturned in appeal by a two to one vote and was further appealed to the Texas Supreme Court. On

October 2, 1989, the Supreme Court declared the existing state funding system unconstitutional, reversed the decision of the court of appeals, and with a unanimous voice affirmed with modification Judge Clark's decision (Edgewood v. Kirby, 1989). Justice Mauzy, in writing for the court, specifically addressed the shortcomings of the existing state funding scheme for facilities. He said:

> Most importantly, there are no Foundation School Program allotments for school facilities or for debt service. (Edgewood v. Kirby, 1989, pg. 3)

He further went on to say:

> Low-wealth districts use a significantly greater proportion of their local funds to pay the debt service on construction bonds while high-wealth districts are able to use their funds to pay for a wide array of enrichment programs. (Edgewood v. Kirby, 1989, pg. 3)

The Texas Supreme Court ruled definitively that the existing state funding scheme was unconstitutional, but did so solely on the basis of Article VII, section 1 "efficiency" aspect. Justice Mauzy called the state's school finance system:

> ...neither financially efficient nor efficient in the sense of providing for a "general diffusion of knowledge" state-wide.... (Edgewood v. Kirby, 1989, pg. 12)

In reference to the inadequacy of the state funding system, Justice Mauzy further added:

> There must be a direct and close correlation between a district's tax effort and the educational resources available to it; in other words, districts must have substantially equal access to similar revenues per pupil at similar levels of tax effort. (Edgewood v. Kirby, 1989, pg. 12)

The differentiation between the Texas Supreme Court's decision and that of Judge Clark rests primarily in the utilization of the word 'substantially' in the above quotation. Judge Clark chose to couch his decision on the absolute equal rather than in a context of substantively equal.

The Supreme Court, however, did not mean for local control to be diminished, but did relay that local enrichment could take place if derived from local tax dollars (Walker, 1989). The Supreme Court decision did not address the manner in which the funding system of the State of Texas was to be corrected. This decision was remanded to the Legislature with the charge to resolve the inequity in funding, inclusive of facilities.

Accountable Costs Advisory Committee

The Accountable Costs Advisory Committee in the State Board of Education's report to the Governor also maintains that there is a great discrepancy in the adequacy of school facilities across the state (The 1987-88 Accountable Costs Study, 1988). The Committee, however, suggested that one of the first undertakings that must be accomplished, prior to state participation in facility funding, is to take inventory of the facilities of the school districts in the state. This inventory would provide a baseline for data analyzation and provide an instrument for scrutiny of the educational facilities in the state.

The Committee also suggested that the need for investment in school facilities by the state would be driven by two factors. The first factor the Committee addressed was the aging of the existing facilities. As the existing facilities age, the need for renovation, additions to existing facilities, and construction of new facilities increases. The Committee found, in its work with the Texas School Services Foundation data base which consists of approximately 51 percent of the school districts in the state, that about 750 million square feet of the data base's 1,250 million square feet of buildings were 20 years of age or older.

Secondly, the Committee suggested that changes in the characteristics of students, changes in locations of student populations, and changes in educational programs and curricula will be factors in school building construction and renovation. As student needs such as remediation, computer literacy, and special education emerge, the facility space and facility design necessary to meet their needs may grow or change. The remedy for these changes will require attention in the form of dollars. The changing demographics of the state, such as increasing poverty levels and increasing numbers of minority children, will also create needs which can only be met through the influx of new money. While many districts are decreasing in student population requiring the closing of schools, other districts are being faced with a growth in student population which places an extreme burden on the existing facilities. The Accountable Costs Advisory Committee suggests that the state will need to participate both in the construction of new facilities and the renovation of existing facilities to meet these needs.

The Accountable Costs Advisory Committee said:

> In order for the state to become involved in the financing of capital outlay and school facilities, it must do several things. First, the state must establish minimum standards for facilities.... (The 1987-88 Accountable Costs Study, 1988, pg. 39)

These standards should address the multifaceted needs of students served by school districts and attempt to correspond these needs to a standard considered to be adequate. These minimum standards would, most likely, center around a square-foot measurement. Once these standards have been adopted, a method of enforcement of the specifications would need to be developed to ensure that adequacy was met or exceeded in new construction and/or remodeling.

The issue of equity was also addressed by the Accountable Costs Advisory Committee. The Committee advocated that a subsidy formula be developed to ensure that the poorest school districts are provided with equitable financial aid. In addition to subsidy for construction and renovation of facilities, the committee suggested that the state incorporate financial aid for the maintenance of facilities.

Legislative Mandates

Legislative mandate requirements are another cause for new construction. House Bill 72 required the construction of many new classrooms across the state. The requirement which caused this need was the reduction in pupil-teacher ratios of 22:1 for the first through fourth grades. The number of new classrooms required to complete the 22:1 mandate for the third and fourth grades was estimated by the Accountable Costs Advisory Committee to be approximately 2,200. A 1986 study performed by East Texas State University and reported in Wolves at the Schoolhouse Door (1989) estimates that by 1996 an additional 32,903 teaching stations will be needed in order to meet legislative mandates pertaining to class size and curriculum. This increase will impose a severe financial burden on many school districts across the state which are already heavily taxed with meeting other state mandates, such as the 22:1 pupil-teacher mandate for the first and second grades and the increases in the teacher salary schedule.

The issue of state aid for facilities was also of interest to the Seventy-first Legislature. Senate Bill 1019, Section 16.401 required that the State Board of Education establish a state-wide inventory of school facilities and that provisions be made to update that inventory on a periodic basis. The inventory would include such information as the condition of the existing school facilities, the utilization of these facilities, the type of facilities, and the replacement costs of public school facilities in the state (Senate Bill 1019, 1989).

Section 16.402 of Senate Bill 1019 also required the State Board of Education to establish standards for the determination of adequacy of school facilities. These standards are to include such aspects as space, educational adequacy, and the quality of construction. Section 21 of the Bill required the State Board of Education to provide recommendations to the Legislature regarding the necessary provisions for state assistance to school districts for facilities beginning in the 1991-92 school year (Senate Bill 1019, 1989).

Senate Bill One also required a facility study to be conducted. This study, however, was related to the cost of adequacy (Senate Bill One, June 8, 1990). However, the requirement of a study rather than a plan was one of the detrimental factors cited for declaring the bill unconstitutional (Edgewood Independent School District et al. v. William N. Kirby, et al., 1990).

Ramifications of the Problem

In order for the state to participate in the funding of school facilities, it is clear that several planning and data-gathering components need to be instituted. There needs to be an inventory of the existing school district facilities which includes the age, use, and condition of the buildings. In order for this to occur, an efficient method of data collection must be identified. This data collection procedure should be amenable to periodic updates of the inventory to monitor changing conditions and populations.

For an inventory to be useful, standards must be developed to describe the conditions of the existing structures and the specifications new construction should meet. When the status of existing facilities is known, it will then be possible to equitably administer a scheme for state participation in the financing of adequate new school construction and for remodeling existing school facilities. Without state participation in the financing of school facilities, many districts will be financially unable to construct new facilities or remodel existing ones to keep up with the needs.

Another component of state participation that pertains to equity is that of existing debt service. Currently, many school districts are heavily indebted because of construction and remodeling costs. All districts were financially impacted with the 22:1 student-teacher ratio mandate, but those most affected were the districts with a low property value per student. A 1986 study performed by East Texas State University and reported in Wolves at the Schoolhouse Door (1989) projected that by 1996 there would be an additional 1.1 million students in Texas' public schools. This increase in student population would require 37,000 additional classrooms costing an estimated $2.1 billion. The report also forecast the status of classroom facilities and estimated that within ten years 5,300 classrooms would become obsolete, 12,400 would be below par structurally, and 10,000 would need replacing because of educational inadequacies. The price tag on these projections was $1.5 billion. Equitable state participation would relieve some of the tax burden on poorer districts faced with high need.

Should the Legislature decide to participate in the financing of school facilities, several issues will have to be resolved. One issue is how to best take an inventory of the existing school facilities. Once an inventory has been accomplished, standards for minimal adequacy must be developed. Another issue is the disposition of present debt that school districts have incurred for existing facilities. Finally, what will be the test of equity pertaining to state participation?

Purpose of the Study

While aid in the form of state dollars is made available for maintenance and operations to school districts in all states, there is generally not enough assistance to provide for adequate operating expenses, much less for significant contributions for the retirement of facility debt. A number of property-poor school districts have been unable to meet construction and remodeling needs due to increasing demands on their respective operations budget (Webb, McCarthy, and Thomas 1988).

This study was undertaken for several purposes. The primary purpose was to provide research data to support state participation in the financing of school facilities. Secondly, to discover if school district wealth was a significant factor for consideration for state-wide policy development and the development and implementation of facility standards. In addition, this study was to discover if the size of school districts was a significant factor for consideration in the development of policy and the implementation of standards. Also, this study was intended to discover if practitioner perception of the space necessary for an adequate education was significantly different from those standards of other states, the recommendations of the literature, and the recommendations of experts in the facility arena. Finally, this study was to provide a basis for the planning of school facilities.

The above questions were addressed by testing the following three null hypotheses:

1. There is no difference between the standards recommended by practitioners, in school districts with above average wealth and those of below average wealth, pertaining to educational space for:

   Elementary Spaces

   1. Prekindergarten
   2. Kindergarten
   3. Grades one through four
   4. Grades five and six
   5. Elementary art
   6. Elementary music

   Junior High/Middle School Spaces

   7. General classroom
   8. Science
   9. Art
   10. Choral music
   11. Instrumental music
   12. Homemaking laboratory

   High School Spaces

   13. General classroom

14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

2. There is no difference between the standards for educational space recommended by practitioners, from school districts of various enrollment groups, for :

Elementary Spaces

1. Prekindergarten
2. Kindergarten

3. Grades one through four
4. Grades five and six
5. Elementary art
6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

3. There is no difference between the standards for educational space recommended by practitioners and those recommended by the literature with respect to:

Elementary Spaces

1. Prekindergarten
2. Kindergarten
3. Grades one through four
4. Grades five and six
5. Elementary art
6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

Limitations of the Study

Certain limitations in this study should be noted. The clarification of questions and interpretations of responses are not practical for a large survey sampling. The assumption that all participants completed the instrument with a full understanding of the task is a limitation that is noted in the findings.

An attempt to minimize the statistical limitation derived from the limited homogeneity of variances between groups was undertaken through the use of non-parametric statistics.

The selection of 15 participants through stratified random sampling in each category of wealth and enrollment may be viewed as a limitation. While enough participants were secured to provide an adequate sampling, the variance related to the percentages of participants to total in each group was mixed (Table 3-2). In addition, as with any random sampling technique, it is possible for providence to deliver a skewed sample.

It may also be viewed as a limitation that the perceptions of teachers and principals have not been included. The experiences of those directly involved in the educational process at the classroom level may bring much to the understanding and planning of educational facility standards.

In addition, this study does not solicit the input of architects. The perceptions of those architects experienced in the design, construction, and development of educational specifications for educational specifications for school facilities may add much to the overall body of knowledge pertinent to the development of facility standards.

CHAPTER TWO

Introduction

Summary of the Problem

There is great inequity between school districts in the state of Texas regarding the adequacy of facilities. Presently, facility construction and remodeling are financed primarily through local tax effort. A survey by The American Institute of Architects Committee on Architecture of Education (1987) reported that 99 percent of construction funding was provided by local effort with the balance provided from federal sources. This effectively provides for a segregation of the ability to adequately finance facilities by both the wealth of the local district and by local tax effort.

Nationally, over $11 billion in school bonds were sold in 1986. In 1987, the figure dropped slightly to about $9 billion (Wood, 1989). In the results of a survey conducted by the _American School and University_ (1989), construction costs per pupil were $10,333 for high schools, $8,456 for middle schools, and $6,849 for elementary schools. If the burden of financing public school facilities is placed entirely on either the state or the local district, the financial burden becomes too great for either to adequately support. If the local district must finance capital improvements solely through local resources, then the poor districts would be at a disadvantage, given their ability to raise substantial money through tax dollars. If the state holds the purse strings for financing facilities, there is a loss of incentive for local fiscal prudency coupled with a prioritization of projects to fit within the state's budgetary constraints. This produces a tendency to finance only the capital improvements which are of highest need. These situations suggest that the financing of facilities should be a shared burden of both the local district and the state (Wood, 1989).

To provide relief from the burden of financial inequality that presently exists between the districts which have and those which have not, a plan for financial assistance from state dollars should be developed. An equitable state funding system would assist poor school districts with facility construction, remodeling, and maintenance costs which would otherwise not be possible or would be burdensome with local tax dollars.

In order to develop a financial assistance plan, the issue surrounding the identity of the educational specifications which determine adequacy of school facilities must be resolved. Once educational specifications for facilities are adopted, the factors of interest to funding need to be isolated and a data collection methodology needs to be designed. The factors of interest to funding would include such items as the wealth of districts; the existing debt associated with facilities, as a function of their wealth; district needs concerning facility remodelling or upgrading, as a function of district wealth; and facility needs due to overcrowding, as a function of district wealth.

Equity Issue

The concept of financial equity in public school systems has recently become an issue of the courts in several states. The concept of equal dollars for equal effort was one of the driving forces in Judge Harley Clark's decision in the Edgewood v. Kirby case. The facet of opportunity is a component of equity which permeates all levels of the funding issue. The equal opportunity, or equal access, of children to "adequate" facilities is one of these components.

While the Third District Court of Appeals in Austin reversed Judge Clark's decision, the dissenting opinion of Justice Bob Gammage upheld the district court's opinion.

> Greater financial support enables wealthy school districts to provide much broader and better educational experiences for their students, including such things as better facilities.... The poorer districts cannot afford to and do not provide as high quality facilities as the wealthier districts, negatively affecting the educational opportunity of children in those districts. (William Kirby v. Edgewood, 1988, pgs. 2-3)

The findings of the Supreme Court laid to rest, at least through the avenue of the courts, the issue of equity of opportunity and effort in an historic, unanimous decision. Justice Oscar Mauzy, in writing for the Supreme Court, reversed the Court of Appeals reversal and upheld Judge Clark's decision with modification. The Supreme Court declared the existing system of Texas public school finance unconstitutional. The decision, however, was not based on the grounds of equitability, but on efficiency (Edgewood Independent School District et al. v. William Kirby et al., 1989).

History

Ancient

Because of wide variations in environmental extremes, our earliest ancestors learned to build dwellings to protect themselves from the elements (Hathaway, 1988). The problems associated with such dwellings as caves and tents may be easily envisioned. In the outdoors, however, the air and water were constantly being refreshed through the natural recycling resulting from wind, sun, rain, and photosynthesis (Hathaway, 1988).

During the Hellenistic and Roman eras, about 500 - 200 B.C., the school was wherever the teacher was. A teacher and his small group of students would meet where convenient, regardless of the presence of a facility. The correlation of education and a facility did not generally coexist until the end of the Hellenistic and Roman periods (Castaldi, 1987).

Early American

Early American schoolhouses were generally simple structures consisting of one large room. They were often drab, crowded, and poorly ventilated (Castaldi, 1987). They were also poorly heated, dimly lit, and provided virtually no sanitation facilities. The population growth which occurred during the early 19th century spawned the need to educate large groups of children, especially in the larger towns. The Lancaster-type schools attempted to accommodate this need. Lancaster schools were large one-room facilities which could house up to 500 pupils. The students were all seated in rows facing the teacher's platform. Education, in Lancaster schools was based primarily on regimentation and discipline (Council of Educational Facility Planners, International, 1976).

Around the turn of the 20th century, some schools reflecting gothic or classical influences could be found. However, for the most part, schools resembled large boxes subdivided into equal parts. There was no effort to provide a structure which supported or facilitated the educational tasks in need of accomplishment (Castaldi, 1987).

Mid-20th Century

During the latter part of this century dramatic changes in school building design occurred. There was an effort, following World War II, to bring the outside indoors. Walls with large expanses of windows designed to bring in natural light and provide views of the outside were in vogue. During the 1960's, architects began to design schools with wings of space emanating from a central area. In the 1970's, air-conditioning became the accepted norm and energy losses due to a large expanse of exterior walls became a concern. This concern dramatically heightened with the energy crisis and school building architecture took a turn toward energy conservation (Castaldi, 1987).

Modern

Until recent times the design of a school building and the educational spaces which it housed had no real correlation with the educational function it was designed to shelter (Castaldi, 1987).

Need for Flexibility in Architecture/Space

The need for flexibility in the design of a school building is enhanced if the building is viewed as a vehicle to promote instruction. Other components center around efficiency. The efficiency of utilization requires that the building must be viewed as an educational tool as well (Castaldi, 1987). In work done by Taylor and reported by Taylor and Gousie (1988), it was demonstrated that there is the capacity for the potential of the architecture of a facility to act as a teaching tool, especially if the design is based on concepts inherent in the curricula (Taylor and Gousie, 1988). For example, the mechanical systems, the electrical systems, the architectural expression of design, and construction aspects are visible throughout the building and provide learning experiences through their functional observations (Christopher, 1988).

Studies reported by Taylor and Gousie (1988) have concluded, by analyzing students over time, that when classrooms have been designed to specifically address the needs of the curriculum, that these facilities increased concept formation and visual perception in preschoolers. In addition, these facilities enhanced creativity, increased positive social interactions during play, and accelerated the learning of English by non-English speaking students faster than a superimposed English as a Second Other Language class in a traditional classroom setting (Taylor and Gousie, 1988).

Future Forecasting of Programs

The computer, television, and other new media are changing the requirements of space. Programmatic changes and expansions of technology and their delivery systems have challenged the standard 30 student classroom concept. Specialized facility needs called for by pre-kindergarten, laboratories, music and art studios require more area and different spatial designs. This evolution of educational programming, if continued, will require continued changes in the concept of space. To accommodate these changes, educational space must be designed with flexibility in mind (Brubaker, 1988).

Community Desires

Facilities should be viewed as an integral part of the community. If, indeed, educational facilities are an important community resource, then planning efforts should be a joint effort between the school and community striving to meet the needs of both arenas (Hathaway, 1988). School facilities should facilitate the community's cultural values (Hathaway, 1988; Taylor and Gousie, 1988) and link the past with the present and future (Hathaway, 1988).

Life-Span of Buildings

Experience has taught us the need for planning for school building recycling. In areas of declining enrollment which produce surplus schools, this is especially true. When a school is located in a commercial area, for example, a flexible design may allow a building to be converted into offices; in a residential area into apartments; and for public use into community or art centers (Brubaker, 1988).

In a study conducted by Benjamin Handler and reported in Wolves at the Schoolhouse Door (1989), a school building has a life cycle consisting of five stages. Each phase represents a time frame which speaks to an expected maintenance status or replacement point.

Phase one corresponds to the building's first 20 years when maintenance costs are generally limited to normally expected minor repairs. Small improvements which are brought on by instructional program changes can also be expected.

Phase two represents the building's life cycle during its twenties. During this period annual maintenance costs are increasing and the need to replace worn out equipment occurs more frequently.

Phase three occurs between the ages of 30 and 40 years. General maintenance needs have rapidly increased and major items such as roofs and light fixtures will need replacing due to natural aging. Most of the original equipment in the building should have been replaced by the end of phase three.

Phase four is from 40 to 50 years. Accelerated deterioration can be expected during this phase and, generally speaking, the educational needs as well as the neighborhoods have changed.

The fifth phase represents buildings older than 50 years. These buildings will likely need complete reconstruction or abandonment. According to Castaldi (1987), the average life expectancy of a school building is 50 years.

Constraining Factors

There are four major classes of factors in a building that may constrain people and programs (Hathaway, 1988). These constraining factors deal with perception concepts, individual items, programmatic components, and other facets surrounding the broad idea of human constraint.

Perceptual

The first component mentioned above deals with the factors surrounding the perceptions the building gives the user which are detected through the five senses. The first component of the perception factor surrounds statements made by the building design itself. The capacity of the facility to complement the natural surroundings, and the manner in which the facility utilizes the climate of the area to enhance energy efficiency rather than fighting nature to maintain a comfortable climate, are attributes which convey a message to the user attesting to the fact that the building is not neutral, but delivers a message (Hathaway, 1988).

Another aspect of perception which may influence physical behavior centers around the concept of accessibility (Hathaway, 1988). A facility should be designed to be barrier-free to all participants and provide easy access to the different areas within the building. If the facility is easy to use and conducive to transfer from one priority area to another, an orderly flow of students can be expected (Glass, 1986; Hawkins, 1985).

The spatial attributes of a facility are also an important component in the perceptual message delivered by a building because these attributes may influence behaviors and convey hidden messages (Hathaway, 1988). Spaces may also be examined in terms of being either public or private. Students may need access to private spaces in order to take risks and explore their capabilities. There should be educational spaces to accommodate these needs. Similarly, teachers need this type of space, the denial of which may lead to lost professionalism (Keller, 1986).

Students also need access to space suited to both active and passive learning (Hathaway, 1988). While space allocations are generally determined on a per pupil basis, there are hints that anxiety levels of building occupants tend to increase when the facilities are operated at or near capacity levels (Hathaway, 1988). Research shows that buildings may be psychologically full at 80 to 90 percent of planned actual capacity (Hathaway, 1988).

Spaces should be scaled to the user of the facility (Hathaway, 1988). While facilities share many commonalities to different users, the placement of specific features within the facility can encourage or inhibit its use (the height of the light switches and the size of the toilets between elementary and secondary campuses).

The condition of a building can also send an important message to the student (Hathaway, 1988). If a facility has had poor maintenance, a student may perceive a message from the building which imparts a negative value in education. Also, the standardization of classroom space can deliver a negative and institutional perception to the user (Keller, 1986).

Individual

Ergonomics (human factors analysis) offers an inventory of factors which can potentially influence student performance (Hathaway, 1988). These elements include components such as physical factors (color, noise, temperature, workspace); physiological factors of the user (height, weight, dexterity, vision, age); idiosyncratic factors (skills, attitude, memory span, intelligence); task-related factors (simple, complex, emergency behaviors, time); organizational factors (group activities, individual pursuits); and social factors (individual and group incentives, social needs). The physical factors will be examined here due to the direct relationship to the physical plant.

In research reported by Hathaway (1988), individuals may be affected by physical factors such as radiant energy, color, noise, temperature, vibration, and air quality. Radiant energy includes electromagnetic energy, light energy, and short wave radiations. There is research which suggests that prolonged exposure to trace amounts of ultraviolet light in the wave length range of 320-400 nanometers may reduce the development of dental cavities and improve attendance of elementary school children.

Classrooms have generally been a 24 foot by 32 foot rectangle which did not exceed 24 feet in width because of the ineffectiveness of natural lighting at a greater distance (Engelhardt, et al., 1949). There is also a study by Ingraham (1983) which provides evidence that children under electromagnetically shielded fluorescent lamps behave differently than children under similar unshielded lamps. This is of consequence because the amount of electronic equipment being placed into classrooms and workplaces is growing at a rapidly expanding rate.

Studies by Sydoriak (1987) have found that people are affected by color. Elevated blood pressure can result in children exposed to warm colors, while cool colors may cause slight drops in blood pressure. Sydoriak suggests that warm colors may therefore be used in stimulating activities and cool colors may encourage relaxation.

Temperature can have a substantial effect on people (Hathaway, 1988). While cooler temperatures may be preferred for sleeping, most people are comfortable in a working environment between 65 degrees Fahrenheit and 80 degrees Fahrenheit. Preferred temperature ranges may be affected, however, by both humidity and air movement.

Noise can have an effect on people (Hathaway, 1988). While background noise can cover unwanted sounds, it can also interfere with aural perception. Normal hearing can be distorted by the reverberation and reflection of sound which may pose difficulties, especially in the hearing impaired, in detecting useful sounds.

Vibrations from traffic and machinery can also have an effect on people. Both unwarranted noise and vibration can elevate anxiety levels (Hathaway, 1988). The levels of noise clearly affect the nature of the learning environment and the behaviors of students and teachers (Taylor and Gousie, 1988).

Air quality should be addressed in three areas. They are humidity, composition, and pollutants. Low humidity can cause dry skin and enhance respiratory irritations. The composition of air may be affected by fuel-burning heating systems and should be monitored to ensure that adequate volumes of replacement air are delivered to minimize oxygen depletion and decrease levels of noxious gases. Pollutants such as tobacco smoke, particulate matter, and microorganisms can also reduce the quality of air. Conditions resulting from low air quality can adversely affect a building's occupants (Hathaway, 1988).

Lighting can also adversely affect the human body. Poor lighting affects neuroendocrine functions, hyperactivity, health, and on-task behavior (Taylor and Gousie, 1988).

Program

The design of a school building should take into consideration factors such as technology, student processing modes, and learning styles (Hathaway, 1988). While these factors may interact with other variables, they may be considered as independent components affecting the manner in which a facility can effect program components.

Technology incorporates hardware, software, "peopleware", and information in the processes of planning, delivery, and evaluation of educational programs. Technological settings may vary from low (teachers are the primary delivery source of knowledge) to high (teachers are the facilitators of learning). If technology is to flourish, spaces must be designed to be flexible and expandable for conversion to the needs of the program. Where the technological aspects of communication and instruction are not readily adaptable to changing program needs, programs may be constrained through the inability of the facility to accommodate the necessary equipment or instructional methodology (Hathaway, 1988).

The student processing mode relates to the manner in which students are grouped in the educational setting (Hathaway, 1988). Students are traditionally placed into a group according to age or grade and then processed together for the duration of the semester or year. On the other end of the spectrum, a student remains in a setting only long enough to master the assigned learning objectives. If the latter is considered important in meeting the educational needs of a student, then flexibility in learning spaces must be considered (Hathaway, 1988).

Research on learning theory proclaims that student learning progresses from the concrete to the abstract. There are, however, students who never leave the level of the concrete learning style. There is a need to consider both of these types of student-learning characteristics and the way learning styles place constraints on the learning environment (Hathaway, 1988). Educators should provide the opportunity for students to be provided with practical applications in learning, and the physical plant should be designed to expose these opportunities. The greater the similarity between the learning situation provided within the school and the situation a student is being prepared to deal with outside the school, the greater the extent that the positive transfer of learning can be expected (Castaldi, 1987).

Other

Safety from disasters, both natural and man-made, is an important consideration in the design of a building. The potential for dangerous accidents produces the need for examination of the safety factors in school buildings. Occupants of school buildings should be afforded protection from such things as toxic chemicals spilled from train derailments, gaseous by-products of industrial mishaps, terrorism, and nuclear fallout, thereby deriving a sense of safety and security from the physical facility (Hathaway, 1988).

The planning of the educational facility should be considered a component of societal planning (Hathaway, 1988). Planning should include considerations for day care, out-of-school care for children, and health services. Planning linked to other institutions is essential if educational facilities will be used for other purposes either during or after normal school hours (Hathaway, 1988).

Another constraint caused by facilities is the lack of flexibility. David Englehardt (1988) suggested that a space which can economically, quickly, and easily be adapted to a different configuration to accommodate a change in instructional delivery, would be deemed flexible. Therefore, a flexible facility would accommodate any type of activity (Englehardt, 1988). An important measure in determining flexibility is the educational or curricular intent of the lesson or course (Englehardt, 1988). The utilization of a partition in the gymnasium in order to house another academic class would, most likely, not be considered as flexible use of intended space.

The Psychology of Space

Research documents that infants and children learn more rapidly in stimulating and varied physical environments which satisfy basic human needs. At present, the average American school facility does not promulgate self expression or promote ownership or involvement in the educational process (Taylor and Gousie, 1988).

Historically, teachers and textbooks have been relied upon to transmit learning, and the effects of the facility and physical surroundings have been ignored as an agent of learning and as an actor in the determination of behavior. The learning process and the physical environment are, therefore, integral parts of each other (Taylor and Gousie, 1988).

School facilities can serve to stimulate or subdue, aid or hinder the creative process, and cause joy or fear (Taylor and Gousie, 1988). Generally, teachers feel powerless in being able to rectify problems generating from deferred maintenance on physical facilities. Teachers have reported high levels of frustration and despair over the inadequate upkeep of facilities (Honeyman, 1989).

The pupil should be the driving force behind the planning of educational facilities. Both physical needs such as safety, sanitation, lighting, and emotional needs (pleasant surroundings and a friendly, restful, and secure environment) of the student should be considered in the design of an educational facility (Caudill, 1954). An architectural design which provides a variety of spatial experiences such as entry spaces with high ceilings, wide circulation pathways, dramatic change in level and utilization of natural light, and interesting views provides for people's psychological needs and enhancement of the learning environment. Both teachers and students benefit from this type of design (Brubaker, 1988). The student's perception of belonging and security is of great importance to the learning process (Castaldi, 1987). It is also important to note that a well-planned facility can encourage incidental learning under predictable circumstances (Castaldi, 1987).

The Effect of Facilities on the Learning Environment

Governmental entities, such as cities and states, have realized that quality public facilities can foster public trust and enhance the performance of employees (Christopher, 1988). Virtually every employee in every occupation can relate to the negative effect which inferior working conditions have on his or her performance (Honeyman, 1989). The private sector has long known the correlation between employee satisfaction, productivity, and the work environment. However, the design of primary and secondary public schools has generally been a low priority (Christopher, 1988; Keller, 1986). Teachers cannot be expected to perform effectively in buildings which are substandard, unsafe, and inadequate (Honeyman, 1989). As an example of productivity in the arrangement of classrooms within the building, it has been shown that the proximity of the library to the classroom has an effect upon the teachers' utilization of the library for classroom activities. Teachers having direct access to the library from their classroom (not having to send students past another teacher's class) were more likely (39 percent compared to 24 percent) to utilize library resources (Englehardt, 1988).

If a student's self-worth can be enhanced by pleasant surroundings and a student's achievement is tied to a positive self-concept, then facilities play a role in providing inspiration for achievement (Christopher, 1988). If a school's educational program is supported by a stimulating facility, interest and achievement will be improved (Christopher, 1988).

While it may be true, that a good teacher can deliver quality instruction despite environmental hurdles, a quality environment can also improve the performance of dedicated teachers (Christopher, 1988; Hawkins, H. L. & Overbaugh, B. L., 1988).

Consequently, poor and inadequate educational facilities can have an adverse affect on the educational process (Honeyman, 1989).

A study performed in a rural Tennessee county school system was undertaken in an attempt to discover if, and to what extent, the facility affects student outcomes. Two school buildings were utilized in the study. One was a relatively new building (four years old) which was modernly equipped. The other was an older building erected in 1939 with an addition constructed in 1950. Very few resources had been put forth to modernize the structure and no conscious effort had been made to replace old furniture, control the acoustics, or coordinate the color scheme. Both schools served grades kindergarten through eight and each offered a similar curriculum. The study centered on 280 fourth-grade and sixth-grade students housed in the two facilities. Students, teachers, and administrators were considered to be similar, as examined through a number of variables.

The findings showed that the students in the modern building scored significantly higher gains in reading, listening, language, and arithmetic than did their counterparts in the older facility. Also, the students in the new facility had fewer discipline problems, better attendance, and less sickness. The researchers concluded, through the analyzation of data, that the physical environment did have a bearing on student achievement, health, attendance, and discipline (Bowers and Burkett, 1988).

The open-space concept of classroom construction made popular during the 1960's and 1970's led to research pertaining to the correlation of open spaces and learning. This research found both positive and negative factors surrounding the open space concept. It was reported that cognitive test scores were not significantly affected by the open concept (Essa, 1978).

This type of space allocation is now on the decline (Hawkins, 1985). Teachers seem to now prefer the standard type classroom. This is probably due to the more chaotic, distracting, and unstructured environment associated with open-space classrooms, as well as the general lack of adequate storage spaces (Taylor and Gousie, 1988).

Effective Schools Research

The impact of the quality and adequacy of school facilities on the instructional process has been an issue of debate for a number of years. While there is research which suggests that the physical condition of a building affects teaching and learning, there is other research that suggests that the research done on this subject is incomplete (Hawkins, 1985). The effect a facility has on a school's climate, however, is an issue of lesser contest.

Considerations of what school means and feels like to students and teachers have sometimes been overshadowed by pressures of performance outcomes. However, the climate of the school may be the most important feature to those who inhabit it daily (Goodlad, 1984). Thus, the environment of a school should be viewed as having a direct effect on attitudes and behavior (Council of Educational Facility Planners, 1976).

Standard School Concept

The concept of what a standard school looks like is one of perception. There has been little research performed pertaining to the composition of an ideal school building. Dr. Warren Hathaway (1988) maintains that a school building is not just a structure which protects people from the environment, but sends messages which may be of a constraining nature. He maintains that there are four basic constraining factors which may exist in a building. First, is the perceptual constraint which is composed of hidden messages received not only through the five senses, but also through an additional sixth sense. Secondly, there are individual constraining factors which affect the domain of human performance which are detected through the five senses. Next are the program constraining factors which interfere with the planning and delivery of instruction. The final constraining factor is that categorized as "other" and consists of items related to such things as safety and security (Hathaway, 1988).

In envisioning the concept of what comprises a standard school, it is important to keep in mind the aspect of usability.

The spatial aspects of a 900-square foot classroom can be confining, especially when a teacher is placed in a classroom with 25 children for five to six hours per day. This type of confinement can lower the effectiveness of the educational program (Glass, 1986).

The proclamation of a standard size for educational spaces also poses dangers in the concept of effectiveness. Too often the average or minimum becomes the maximum standard. When this occurs, the importance of designing an educational space to accommodate the needs of the program would be given a backseat to the predetermined standard (Graves, 1981). Therefore, care must be given to the utilization of standards in the educational arena.

The per-pupil square foot assumptions that may be used in planning adequate classroom space by instructional area, according to Glass (1986) are reflected in Table 2-1.

Table 2-1

Classroom Space for General Instructional Areas

INSTRUCTIONAL AREA	SQUARE FT./PUPIL
CLASSROOMS (GENERAL)	30
SCIENCE LABORATORIES	50
HOME ECONOMICS	50
SHOP (GENERAL)	125
SHOP (VOCATIONAL ED.)	150
TYPING CLASSROOMS	40
ARTS AND CRAFTS ROOMS	50
BAND ROOMS	50
SPECIAL EDUCATION/REMEDIAL	60
BUSINESS EDUCATION	40
PE GYMS	125
LIBRARY	50

(Glass, 1986, pg.9)

Basil Castaldi (1987) has also made recommendations pertaining to the size of specific areas of student instruction and interaction for secondary school facilities. Castaldi's recommendations are reflected in Table 2-2.

Table 2-2

Classroom and Storage Space for Secondary School Facilities

TYPE OF SPACE	SUGGESTED MAX CLASS SIZE	SUGGESTED SPACE	ADJACENT STORAGE
ART			
GENERAL	25	1,000-1,200	100-150
ARTS & CRAFTS	25	1,100-1,400	175-225
COMMERCIAL EDUCATION			
OFFICE MACHINES	25	800-900	20-40
OFFICE PRACTICE	25	800-900	20-40
TYPING	35	850-950	20-40
HOME ECONOMICS			
GENERAL	24	1,200-1,400	50-75
LIVING CENTER	4-8	400-500	
CLOTHING	24	900-1,000	50-75
FOODS	24	1,000-1,200	20-75
MUSIC			
BAND/ORCHESTRA		1,200-1,600	CABINETS
INSTRUMENT STORAGE		250-300	
CHORUS		1,200-1,400	CABINETS
PRACTICE ROOM	1-6	100-125	
PRACTICE ROOM	1-4	75-100	
PRACTICE ROOM	1-2	50-75	
THEORY	30	700-850	
OFFICE		150-200	
LISTENING/RECORDING/ MUSIC LIBRARY	6-10	350-450	
PHYSICAL EDUCATION			
GYMNASIUM (ONE TEACHING STATION ONLY)	40	3,700-4,400	300-400
GYMNASIUM (TWO TEACHING STATIONS WITH FOLDING PARTITION)	40	5,600-7,000	250-350
CORRECTIVE ROOM	20	600-900	
COACH OFFICE		250-300	
TEAM ROOM		700-900	250-300
OTHER STANDARD GIRLS GYM	40	3,000-4,000	250-300
AUX. GYM-ONE TEACHING STATION-(GIRLS)	40	2,000-2,400	14-16 CEILING
LOBBY		800-1,000	
VISITING TEAM ROOM		500-700	

Table 2-2 Continued

TYPE OF SPACE	SUGGESTED MAX CLASS SIZE	SUGGESTED SPACE	ADJACENT STORAGE
PHYSICAL SCIENCES			
BIOLOGY	25	900-1,000	150-175
CHEMISTRY	25	1,000-1,100	200-250
GENERAL SCIENCE	30	900-1,000	125-150
PHYSICS	25	900-1,100	200-250
GROWING ROOM		200-300	
DARKROOM		60-100	
INDUSTRIAL ARTS (NON-VOCATIONAL)			
GENERAL SHOP	20	1,500-2,000	150-200
MECHANICAL DRAWING	25	850-950	50-75
GENERAL METALS	20	1,700-2,000	150-200
GENERAL WOODS	20	1,500-1,800	150-200
ELECTRICAL SHOP	20	900-1,200	100-150
POWER MECHANICS	20	1,600-2,200	150-200
METAL SHOP	20	1,600-2,000	150-200
WOOD SHOP	20	1,400-1,600	150-200
GRAPHIC ARTS	20	1,000-1,100	150-200
PLANNING ROOM		400-450	
OTHER FINISHING ROOM		100-300	
GENERAL STORAGE SPACE			100-125 PER SHOP
OCCUPATIONAL EDUCATION			
AGRICULTURE SHOP PLUS	20	2,400-2,600	500
GREENHOUSE		1,400-1,600	
AUTO REPAIR	20	5,000-5,400	500
FRAME STRAIGHTENER		450-500	
SPRAY BOOTH		450-500	
BAKING	20	2,400-2,600	400
BOAT BUILDING	20	2,800-3,200	300
CABINET MAKING	20	3,000-3,400	400
FINISHING ROOM		300	
CARPENTRY	20	3,000-3,400	400
COMMERCIAL ART	20	1,400-1,600	200
COSMETOLOGY	20	1,400-1,600	150
DATA PROCESSING	15	1,100-1,300	
DENTAL LAB	20	1,600-1,800	200
DISTRIBUTIVE ED	25	1,000-1,200	
D.E. STORE		500	
DRAFTING	20	1,500-2,000	150
ELECTRONICS	20	1,200-1,500	100

Table 2-2 Continued

TYPE OF SPACE	SUGGESTED MAX CLASS SIZE	SUGGESTED SPACE	ADJACENT STORAGE
ELECTRICAL SHOP	20	1,800-2,000	150
ELECTRICAL LAB MACHINERY		800	100
ELECTRICAL LAB APPLIANCES		500-600	100
FOOD TRADES	20	2,000-2,400	400
DINING & SALES		800	
2 DRESSING ROOMS		50 EACH	20
MACHINE SHOP	20	3,000-3,200	400
INSPECTION ROOM		300-400	
MEDICAL ASSISTANT	20	1,100-1,300	150
MEDICAL LAB	20	1,200-1,400	200
METAL FABRICATION	20	2,800-3,200	400
OPTICAL TECH	20	1,400-1,600	200
PAINTING & DECORATING	20	1,500-1,700	200
PATTERN MAKING	20	1,900-2,100	200
PLANT MAINTENANCE	20	2,800-3,000	250
PLUMBING	20	2,000-2,400	300
PRACTICAL NURSING	20	1,800-2,200	350
PRINTING	20	3,600-3,800	300
SHEET METAL	20	2,000-2,400	300
UPHOLSTERY	20	1,500-1,700	200
WELDING	20	2,400-2,600	350
CLOTHING TEXTILES	20	1,600-1,800	200
CONSUMER ECONOMICS	20	800-900	
DIETICIAN'S ASST.	20	800-900	
FAMILY LIVING	20	800-900	
FASHION DESIGN & MERCHANDISING	20	1,000-1,200	
FOODS & NUTRITION	20	1,500-1,800	300
HOME AIDES			
GERIATRIC AIDES	20	1,000-1,200	300
PEDIATRIC TRAINING	20	1,000-1,200	300
NURSERY SCHOOL AIDES	20	1,200-1,400	
KINDERGARTEN AIDES	20	1,000-1,400	
RELATED CLASSROOMS	20	800-900	
OTHER SPECIALIZED SPACES			
MATHEMATICS LAB	25	850-900	100-125
LANGUAGE ARTS LAB	30	900-1,000	75-100
SOCIAL STUDIES LAB	30	900-1,000	75-100

Table 2-2 Continued

TYPE OF SPACE	SUGGESTED MAX CLASS SIZE	SUGGESTED SPACE	ADJACENT STORAGE
NONSPECIALIZED INSTRUCTIONAL SPACES			
LARGE CLASSROOMS	35	800-850	20-40
MEDIUM CLASSROOMS	30	750-800	20-40
SMALL CLASSROOMS	25	650-700	20-40
CORE CURRICULUM	30	750-800	75-100
COMMERCIAL	30	750-800	20-40
	(Castaldi, 1987, pgs. 290-294)		

Ben Graves (1981) provides more general guidelines for educational spaces of general purpose classrooms (Table 2-3).

Table 2-3

Educational Space for General Purpose Classrooms

GRADE	AREA	SQ. FT. PER CHILD IN LARGEST CLASS
KINDERGARTEN	1,000-1,200	40-50
1-3	750-900	25-30
4-6	750-900	25-30
7-12	575-750	20-25
	(Graves, 1981, pg. 19)	

Castaldi (1987) recommends that the auditorium seat, at a minimum, the largest class contained in the building plus 50 for larger schools. For other size schools, a seating capacity of at least 350 is desired. The recommended seating capacity is one half the ultimate capacity of the building. The maximum seating capacity for an auditorium should be no more than the smaller of the entire student body or 1,200-1,500 seats at seven to eight square feet per person.

The auditorium stage should be 1,800-2,200 square feet while the checkroom should be 200-300 square feet. The lobby should be fairly spacious at 1,500-2,000 square feet. Storage space should be as near the stage as possible and comprise an area of 250-300 square feet (Castaldi, 1987).

The library should consist of a reading room of between 1,200 and 2,000 square feet, and seat 40-75 students (or about 10 percent of the enrollment). For larger schools, two or more reading rooms should be designed. There should also be carrels sufficient to accommodate three to five percent of the student population. Carrels for self-instruction should meet the needs of three to five percent of the school's enrollment and be approximately 25 square feet per carrel (Castaldi, 1987).

There should be one library conference room for every 300 students with a space of about 150-300 square feet. The librarian's office should encompass about 125-300 square feet and a book processing room to receive and catalog books of about 150-200 square feet (Castaldi, 1987).

There should also be an audiovisual workroom of about 250-300 square feet for previewing materials. An adjoining workroom of about 350-450 square feet is also recommended (Castaldi, 1987).

The dining area should be about 12-15 square feet per diner, with a capacity of not less than one-third of the highest anticipated enrollment plus 50. The kitchen should be a minimum of two square feet per meal, with a serving space of five-tenths to eight-tenths square feet per student of the dining capacity. For secondary schools whose enrollments are less than 300, a seating capacity of one-half the highest anticipated enrollment is recommended (Castaldi, 1987).

A storage place and can wash area which would be easily accessible for delivery purposes should comprise an area of about eight-tenths square foot per meal. A teacher's dining room should also be included at a square footage of about 12 square feet per person (Castaldi, 1987).

Remedial instructional spaces should be planned in an area which may be within the library. This should be an area of about 400-500 square feet for both reading and speech, as well as a 400-500 square foot area for general remedial work (Castaldi, 1987).

An activity room for student use should be from 450-600 square feet, depending upon its intended uses. A storage space of 80-100 square feet for student activities should also be planned. A multi-purpose study room with an area of 15-20 square feet per pupil should be included (Castaldi, 1987).

Castaldi (1987) recommended space types, number, and sizes for elementary school building design (Table 2-4).

Table 2-4

Educational Space for Elementary School Buildings

TYPE	NUMBER NEEDED	CLASS SIZE	RECOMMENDED AREA IN SQ.FT.
KINDERGARTEN	1 PER 20 PUPILS	20	1,000-1,200
KINDERGARTEN STORAGE, WARDROBE AND TOILET	1 PER ROOM		300-350
CLASSROOMS	1 PER 25 PUPILS	25	850-900
LIBRARY	1 PER 15 OR FEWER TEACHERS		900-1,000
REMEDIAL ROOM	1 PER 5 TEACHERS	6-10	350-450
SPECIAL CLASSROOMS			
RETARDED, GIFTED	AS NEEDED	12-15	900-1,000
STORAGE	1 PER CLASSROOM		150-200
PHYSICAL ED	1 PER 15 TEACHERS		2,400-2,800
STORAGE	1 PER P.E. UNIT		400-450

(Castaldi, 1987, pg. 271)

There should be an auditorium for each school with 21 or more teachers, with a capacity of 50 percent of the building's enrollment. The auditorium may be combined with the cafeteria in schools having 15-21 teachers. For small schools having fewer than 15 teachers, the auditorium may also be combined with a multi-purpose room (Castaldi, 1987).

The cafeteria should have one-third the capacity of the student population. In schools of 15-21 teachers, it may be combined with the auditorium and in smaller schools combined with the physical education area. The cafeteria should have a space of 10-12 square feet per diner. The kitchen should have a capacity of one and one-half square feet per meal served; the food storage area should have one-half square foot per meal; and the serving area of eight-tenths square foot per diner. There should be two serving areas per cafeteria.

In addition to being a place where learning takes place, a school building must itself be viewed as a contributor to learning. Research reported by Harold Hawkins and Betty Overbaugh (1988) suggested that:

> 1. When the school building is a reflection of the community it is likely that increased learning will take place.
> 2. The school building aids learning when it readily meets the user's needs.
> 3. Student learning is related to teacher professionalism.
> 4. The interface between facility and learning occurs when communication is fostered.
> 5. The creation of an appropriate environmental setting for learning was general throughout the schools visited.
> 6. The facility needs to accommodate a variety of individual learning styles.
>
> (Hawkins, H.L. & Overbaugh, B.L., 1988, pgs. 6-7).

The results of the research project reported above were achieved by an interdisciplinary group of professors at Texas A&M University, composed of representatives from the departments of educational administration, sociology, educational psychology, curriculum and instruction, and environmental design. The project's results were obtained by using both the nominal group technique and a modified Delphi technique.

The concepts of a standard school are also addressed by Basil Castaldi (1987) as containing the three elements of adequacy, efficiency, and economy, which are fundamental to the planning of an educational facility (Castaldi, 1987). The adequacy component would be measured by the degree to which a facility satisfies the qualitative and quantitative requirements of the educational program; efficiency by its relationship to the functional characteristics of the building's design; and economy by the estimation of potential educational return for the dollar (Castaldi, 1987).

Adequacy

The adequacy of a facility centers basically around the elements of size, shape, number, and quality of space, as used for educational purposes. This also includes such components as environmental controllability, shape, atmosphere, location, ease of use, and long-range economy (Castaldi, 1987).

Adequacy of Number

The educational program should drive the determination of educational specifications of a facility. These educational specifications should address the number of spaces estimated to be both necessary and sufficient for the desired educational program (Castaldi, 1987; Westbrook, 1989). In addition to the instructional spaces, a certain number of supporting spaces must be present in an adequate facility. These supporting spaces would include storage areas, preparation rooms, faculty offices, research areas, washrooms, locker spaces, toilets, and lounges (Castaldi, 1987). The number of educational spaces and related spaces would primarily depend on the scope of the educational program being offered and the type and size of the facility being planned.

Adequacy of Size

The proper function of a facility may be influenced by the size of the instructional space, especially if the number of square feet falls below the minimum needed for the desired function. The size of these spaces is usually based on accepted practices. However, functional analysis should also be used when actual measurements, under experimental conditions, can be performed (Castaldi, 1987).

Adequacy of Environmental Controls

The thermal, acoustical, and visual controls of a facility are directly related to the needs of the human body. Therefore, adequate environmental control is necessary for effective learning and essential to healthfulness (Castaldi, 1987). Instructional spaces should be designed with the capacity to regulate both heating and cooling. In addition, they must provide adequate lighting and optimum acoustical characteristics (Castaldi, 1987).

Suitability of Shape

The shape of an instructional space should be suited to the activity for which it was intended. Generally, a rectangular shaped classroom is suitable for classes of about thirty students when the children are involved in non-laboratory type instruction. Shape, however, may be critical to some instructional methodologies and programs (Castaldi, 1987; Hawkins, 1985).

The concept of space suitability focuses on the relationship between the characteristics of a space and the program needs intended for that space (Hawkins, 1985).

Suitability of Atmosphere

As the architect designs a school building, he or she should create an environment which is psychologically stimulating. The color, proportions, shape, lighting, placement of doors and windows, texture of the interior surfaces, and furnishings all contribute to the atmosphere of the facility. The total effect of these items should serve to be both pleasing and stimulating to the student to ensure that he or she feels welcomed and an integral part of the space (Castaldi, 1987). Color is also an important ingredient in creating or enhancing the proper psychological environment of an educational space (Castaldi, 1987).

Adequacy of Space Relationships

A school building should be designed so that all parts act in concert with each other to support an environment conducive to learning. All of the spaces should be strategically located to enhance the functional relationships and allow activities within the building to be conducted efficiently, conveniently, economically, healthfully, and safely (Castaldi, 1987).

The clustering of functionally related spaces will encourage communication between faculty and staff, as well as adding economy and efficiency to the facility. For example, the placement of all sciences in a high school building would necessitate the utility and storage spaces needed for those instructional arrangements be placed in a central location. Generally speaking, it is recommended that the design of an educational facility be conceived such that related spaces are located in close proximity to each other (Castaldi, 1987; Glass, 1986).

In contrast to the location of functionally related spaces, it is also important to separate those spaces which are unrelated or distracting to others (Castaldi, 1987; Glass, 1986). This may be due to noise problems, such as those pertinent to gymnasiums and music rooms, or for psychological reasons, such as the location of the counselor's office in the same suite as that of the principal who administers discipline. For aesthetic purposes, large areas should be separated somewhat, and for economic reasons, air-conditioned space should not be positioned adjacent to the boiler room. The principle of separation, however, should be used judiciously in order to properly place related spaces and avoid isolating a space from those to which it is related (Castaldi, 1987).

The time factors pertaining to separation can also be of importance. If the distance between classrooms or clusters of space are too great, it may be necessary to expand the amount of time between periods in order to allow students to make necessary class changes. This will either diminish the academic portion of the class periods or necessitate a lengthening of the school day (Castaldi, 1987).

The placement of specific space utilizations can also become a factor concerned with safety and health. The location of storage space, for example, in a shop loft may endanger both students and staff needing access to stored items. The same is true for the storage of dangerous chemicals on hard-to-reach shelves in the science laboratory (Castaldi, 1987).

Efficiency

Efficiency and economy are only similar in that both concepts should be critical in achieving the best return for each dollar expended on a facility. Efficiency refers to the architectural design which will enhance the effectiveness of the building, while economy refers to the savings derived from that design. In other words, efficiency relates to a functional return for the dollar and economy relates to the educational result for the dollar (Castaldi, 1987; Westbrook, 1989).

For functional efficiency, the planner must consider the type of teaching materials, instructional equipment, and methodologies to be used in the classroom. Functional efficiency requires that both the building and its equipment be considered as a single educational tool (Castaldi, 1987).

Educational plants should be designed to minimize the costs of maintenance and operations. The operational costs of a facility are directly related to the costs of services, fuels, supplies, and utilities, while maintenance costs are considered to be those associated with upkeep and repair (Castaldi, 1987).

The design of the building, the materials chosen in its construction, and the equipment selected to go in it should be chosen with the primary intent and purpose of maximizing human efficiency. The features in a facility that save time for the employees who operate and occupy the structure can have a direct bearing on the economics of building utilization and upkeep. The insulation factors of the building serve to minimize utility costs, the type of material used in construction impacts the costs of upkeep and maintenance, and the quality of the materials can be directly correlated with the life expectancy of the facility (Castaldi, 1987).

The storage of materials can not only affect the safety component of a building, it can also have an effect on the efficiency aspect. Materials should be stored as closely as possible to the area in which they will be used. Storage facilities should also be strategically placed pertinent to access, delivery, and distribution points. It is also important to plan the storage of items to prevent spoilage or damage (Castaldi, 1987).

The ebb and flow of student circulation patterns is an aspect of the design of a facility which will have an effect on the educational functionality of a building (Glass, 1986; Hawkins, 1985). Ingress, egress, and circulation within a building should be considered to allow a smooth and rapid transition between educational buildings on a campus and between classrooms within a building. Care should be taken, however, not to be excessive in this area. Unnecessary circulation space is wasteful in both the initial investment and the ensuing operational overhead (Castaldi, 1987).

Economy

A crucial element in the efforts of school planners is to achieve maximum economy in the capital outlay and operational aspects of a proposed facility. While every effort should be made to design a building which is economical, economy should not be considered synonymous with cheapness. Economy should, however, be recognized as the achievement of the greatest educational and utilitarian values for the dollar (Castaldi, 1987).

The effort to produce an economical facility has long fallen on the shoulders of local school boards and administrators who have spent countless hours pouring over design plans in an attempt to cut back costs. If the truth were known, only a small percentage of the costs of construction are truly at the discretion of school boards (Castaldi, 1987).

The potential savings, which can be obtained by local boards by being frugal in choosing items which are less costly in construction materials, fixtures, and equipment is minimal. On the average, the assessment of a school building's total cost distribution is 20 percent for various fees, equipment, fixtures, and site development and 80 percent for actual construction. Of the construction costs, 30 percent is for heating, ventilating, electrical, and mechanical equipment (Castaldi, 1987).

The 50 percent balance of the total cost has within it labor costs, which comprise about one-half of the figure, which the local board has little, if any control over. The remaining 25 percent is construction materials. Of this 25 percent, one-half is predetermined by physical requirements such as concrete and steel. This leaves approximately 12 percent of the total cost of construction for the board to initiate cost-savings measures upon. The maximum savings a board could hope to realize, from the 12 percent figure of controllable cost, is about one-half, or six percent of the total costs. Since few boards have members who are architects and engineers, it is reasonable to assume that the general figure for savings is around two to three percent of the total cost (Castaldi, 1987). However, this small savings is not without great sacrifice in terms of time and effort to those board members involved. Substantial economies are, however, possible by using new concepts, creative designs, and long-range planning (Castaldi, 1987).

Facility planners must be able to distinguish the difference between true and false economies. True economy in construction will reduce the cost of construction without negatively affecting the educational efficiency of the intended programs and reduce initial costs without causing increased expenditures for maintenance and operations (Castaldi, 1987).

The design of a school building not only affects the cost of construction, but also plays a large role in the costs of maintenance and operations. In the design of an economical building it is, therefore, advisable to keep the linear feet of the perimeter as small as possible. However, facility planners must understand that the primary purpose of the facility is to educate students. Therefore, no predetermined design should be automatically adopted prior to analyzing the needs of the educational program to see how the design satisfies these needs. Stock plans should be avoided, since they tend to have minimal cost savings over the long term (Castaldi, 1987).

Educational economy is dependent on the close scrutiny of several components. The analyzation of variables pertaining to new facility locations, abandonment of obsolete buildings, and judicial rehabilitation of existing facilities with educational potential are a few categories of items in need of review. If economy in school planning is to be improved, then considerations surrounding these factors should serve as an initial effort. Other suggestions recommended by Castaldi (1987) include designing instructional places to be multi-functional; avoidance of classroom ceilings which are higher than necessary; reducing the amount of glass to decrease maintenance and operation costs; maintaining ventilation as low as possible while still meeting minimum needs (usually about ten cubic feet of fresh air per student per minute); and using construction materials selected on the basis of ease of maintenance and durability (Castaldi, 1987).

The concepts of maintenance and durability are important in the light of rising costs for labor, materials, and energy. Therefore, the selection of a building design which satisfies only one of these components may be detrimental in the long run. A design that is not costly to maintain entails more than selecting materials which are easy to clean. The initial costs of construction items should be weighed against upkeep costs and energy savings over a period of twenty years or more (Castaldi, 1987).

Need for Standards

Changes in the direction of education, from a curricular and programmatic perspective, are necessitating a redesign of the traditional educational facility. This will, undoubtedly, be costly in the remodeling of older buildings, but necessary if these facilities are to be used to meet the demands of changing student needs and educational goals (Jolivet, 1988).

Needed for Development of Inventory System and Financing

The establishment of guidelines for new construction and renovation is not enough. In addition, the condition of existing facilities must be monitored and compared to acceptable standards (Honeyman, 1989).

Guide for Districts Planning to Build

When planning a future facility, Hathaway (1988) maintained that forecasting alternative futures pertaining to the needs which the facility would address would be helpful in ensuring the construction of a building which would be flexible and better able to serve both present and future needs. After several plausible futures are examined, a selected scenario would then be chosen to determine the potential impacts future social policies and plans might have on the school and facility. If this effort were utilized, a future facility could more effectively serve the multiple needs of both the school and community (Hathaway, 1988).

Four broad categories, to be incorporated into the facilities planning process, were prescribed by Hathaway (1988) to help ensure that a future facility has the ability to serve a broad range of needs for both the school and community. The first category called for planning, which would allow for the rapid change occurring in education to be balanced with elements of stability. The second area centered around planning, which would consider learning to be a lifetime activity with multiple needs and purposes. The third aspect dealt with planning, which focused on advancing technological functions and research on how learning occurs. The final category called for planning, which viewed the educational system as being composed of the four dimensions of elementary, secondary, post-secondary, and non-formal (such as libraries, training centers, and information networks) instructional categories (Hathaway, 1988).

The research reported by Englehardt (1988) suggests that the options for teaching methods (specifically science) be determined prior to drafting the educational specifications (Englehardt, 1988).

Taylor and Gousie (1988) suggested several architectural components to help ensure that the design of a facility supported and nurtured the developmental needs of children. The three broad need areas for design were reported to be the body, mind, and spirit. The body's levels of functional need were for food, exercise, and self-help. These bodily needs could architecturally be supported by such things as child cooking kitchens, greenhouses, gardens, earth cellars, fitness trails, exercise and dance spaces, and tennis courts.

The mind's levels of functional needs were for perception and sensory awareness, concept formation, literacy and language, environmental understanding, and computer literacy. Architectural designs reported to support these functional levels were the ambience qualities of the environment, cognitive development centers, nature walks, landscaping, signage, architectural projects, and by always having part of the school under construction.

The spirit's levels of functional needs centered around creative and aesthetic areas such as art, music, dance, and drama; cultural pluralism and global education; and personal and social growth. These areas were reported to be functionally supported by architectural design through the use of art studios, wall graphics, music studios, dance spaces, areas to promote fantasy and imagination, and simulated environments (Taylor and Gousie, 1988).

The Guide for Planning Educational Facilities, by the Council of Educational Facility Planners (1976), maintains that educational specifications should be the driving influence in building design. These educational specifications should describe the programs intended to be housed in the facility in enough detail to allow the architect to transcribe these needs into the physical structure and arrangement.

Special Needs of Special Students

Special education students comprise approximately 11 percent of the nation's student population (1987 figure). The effect on the access and utilization of public school facilities by handicapped students must be of paramount concern to public school facility planners. The requirements of both the educational and legal arenas necessitate special considerations in the design of educational facilities and their ease of ingress, egress, and utilization (Council of Educational Facility Planners, 1976).

Some of the school building design factors which accommodate students with special needs may be found in the Guide for Planning Educational Facilities (1976).

- At least one primary building entrance, automatic doors (with pressure sensitive mats and appropriate time-delayed closure) which slide rather than swing open.
- Ramps instead of steps and curbs, both inside and outside buildings.
- Carpeting on floors to reduce slipping and to cushion falls.
- Wide classroom entry-ways without doors (which permit students free access) but which restrict visual and auditory exposure to the corridors.
- Use of safety glass for doors and accessible windows.
- Avoidance of sharp corners, surfaces, and projections
- Toilets that are convenient and available, with space and hardware to permit independence.
- Hardware on doors, sinks and cabinets that can be used by all exceptional students and can be quickly identified by the blind.
- Vertically adjustable chalkboards set approximately 18-24 inches away from the wall to permit use by students in wheelchairs.
- Switches, controls, fire alarms within reach of people in wheelchairs.
- Horizontally mounted railings or grab bars.
- Furniture that can be adjusted vertically and horizontally to meet the needs of individuals or groups of students.
- Specially designed storage spaces to accommodate wheelchairs, walkers, standing tables and other large equipment.
- Raised or recessed signage to identify rooms and spaces.

> . Additionally, careful attention must be given to emergency and fire protection systems including easily operated emergency doors, barrier free corridors, and warning signals that are comprehensible to all exceptional students.
> . Fire alarms, for example, must be equipped with audio signals for the blind and visual signals for the deaf.
> (Council of Educational Facility Planners, 1976, G-4, G-5)

Standards in Other States

Every state holds some degree of control over the construction of facilities by virtue of various building codes. The approval of plans by state offices, such as the fire marshall, help ensure public safety. As long as state statutes are met, however, states such as Texas exercise no control over the decision to build a school building (Wood, 1989).

The range of state control is from one extreme to the other. In Hawaii, for example, the state approves and totally finances public education facilities. In Texas, however, there is neither state aid nor state education agency approval needed in order to build (Wood, 1989).

The states which have standards, both mandated and recommended, usually utilize a combination of two metrics of square feet per student and square feet per program in their facility standards. In many of the square feet per program standards, a maximum class size is also recommended. A common variable used throughout states' standards is grade level.

Some states, such as Florida, provide minimum, normal, and maximum square foot per student standards. Others, however, provide only one standard and expect the local school district to utilize this standard as a guideline for planning adequate educational and support spaces. In many cases where the single standard concept is utilized, it becomes the benchmark by which state funding participation levels are measured. Many of the states which participate in the funding of school facilities provide standards which may be considered the bare minimum for adequacy. The local school district must supplement the balance of the funding for facilities which exceed these minimal standards.

Generally, states which have recommended standards expect the local district to construct facilities which are flexible in terms of possible future needs, as well as present needs. The nature of the program, scope of the program, needs of the community, grade level of the students, and characteristics of the students are all components of flexibility.

How Standards were Developed

The development of standards in other states were derived by various methods. The predominate method is historical precedence. However, some states, such as Michigan and Oklahoma, utilized professional facility planners, practicing teachers and administrators, citizens from local communities, and university professors in developing recommendations for facility standards.

Developing Standards for the Future

Planning educational facilities which are not quickly made obsolete, in view of ever changing technologies, pedagogies, learning resources, and delivery systems, is a difficult task (Hathaway, 1988). For example, will technological advances be utilized to promulgate present teaching strategies and methodologies, or will there evolve a system whereby education is individualized and customized? The facilities necessary to accommodate these two different approaches to the use of technology can drastically differ (Hathaway, 1988). While the changes in educational programming and methodologies are difficult to forecast, it is important to attempt to anticipate the future, if the sole purpose of such an exercise is only to think critically of the present (McInerney, 1987).

Before effective planning of educational facilities can occur, the intended educational program must be examined. The educational program should outline each educational objective and its planned activities. For example, spaces for standard teacher-directed learning experiences may differ dramatically from those utilizing laboratory or group activities. The planning process, regardless of the educational program, should include the identification of the users, description of the learning activities and their desired outcomes, the determination of relationships among and between learning spaces, a description of the desired furniture and equipment, and specification of any special environmental considerations (Council of Educational Facility Planners, 1976). It is essential that the age of the student, type of curriculum intended, and the number of students to be served in a given educational space be considered when planning an educational facility (American Association of School Administrators, 1949).

The future educational facility may very well have to contend with constraints such as pure air, water, fuel shortages, and land. As a consequence, the design and utilization of facilities will have to address these scenarios.

Presently, educational facilities are used about 15 percent of the time. Educational facilities should have multiple uses which take advantage of the building resource to enhance activities in more than one arena besides public education (Hathaway, 1988). The use of educational facilities to support community education activities, out-of-school care, recreation, and post-secondary education efforts are just a few examples of how a building resource may be used, other than during the school day. The key for such utilization will be to accommodate multiple users concurrently and sequentially during a day or year (Hathaway, 1988).

In order to best utilize existing and future physical facility resources, it will be necessary to change current

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philosophies surrounding property ownership. Which public entity holds title to a piece of property is generally of little concern to the majority of tax payers. For example, a school building closed due to an enrollment decline could be used efficiently for another need such as a city hall. The coordination of the use of public social services facilities may be an area of concern. The concept of public space managers would aid in the efficient use of all public facilities, including educational facilities, by coordinating the changing needs of multiple social service entities with existing facilities (Graves, 1976).

The planning of facilities for alternative uses should be a priority (Hathaway, 1988). A building may be needed as a school today, but in 35 years will the population change to such a degree that the location of a school would better serve the needs of a community elsewhere? If so, the facility could be turned into a retail center or nursing home, if the initial design took this into consideration. Another important component which may impact the design of a school building is disaster. Disaster in the form of earthquakes, industrial accidents, or terrorism may well be a reality in the future. Provisions for turning a school building into a refugee center, nuclear shelter, or other social support system should be considered when planning a future facility. Also, increased security to protect the student population and equipment may be necessary if social turmoil and strife continue to rise (Hathaway, 1988).

Technological advances would be another consideration when planning a future building. Advances in the area of robotics may serve to eliminate some of the menial custodial tasks, such as sweeping and vacuuming in a school of the future (Hathaway, 1988). Creative designs in school architecture, such as monolithic domes, could enhance energy efficiency and drastically reduce maintenance costs on items such as roofs and heating-ventilation/air conditioning systems (South, 1987). The most important technological advancement that should concern facility planners, however, is in the area of instruction. The customizing and individualizing of education, possible through the use of technology, should be a driving force in the customizing of facilities to meet the needs of future generations (Hathaway, 1988).

The change of a teacher's role from that of knowledge dispenser to that of learning facilitator would have a great impact on the planning of educational spaces. School spaces in the future would probably support both the traditional classroom delivery of instruction as well as the customized methodologies available by technological advances. Planning for the flexibility of space would be a design imperative for the building of the future (Hathaway, 1988).

CHAPTER THREE

Methodology of the Study

This chapter describes the design and methodology used to gather and analyze the data pertinent to answering the research questions. The research questions were:

1. What are the differences between the views of practitioners from above average wealth districts and those of below average wealth districts with respect to educational spaces for general classrooms, laboratories, vocational areas, and special education areas?
2. What are the differences between the views of practitioners from school districts with varying pupil enrollments with respect to educational space for general classrooms, laboratories, vocational areas, and special education areas?
3. What are the relationships or differences between the practitioners' views and those of the literature and the experts with respect to educational spaces for general classrooms, laboratories, vocational areas, and special education areas?

The following null hypotheses were tested:

1. There is no difference between the standards recommended by practitioners, in school districts with above average

wealth and those of below average wealth, pertaining to educational space for:

A. General Classrooms
    1. Elementary
    2. Middle School and Junior High
    3. High School
B. Laboratories
    1. Science
    2. Arts/Crafts
    3. Music
C. Vocational/Industrial Arts Areas
    1. Shops
D. Business Education
E. Special Education

2. There is no difference between the standards for educational space recommended by practitioners, from school districts of various enrollment groups for:
    A. General Classrooms
        1. Elementary
        2. Middle School and Junior High
        3. High School
    B. Laboratories
        1. Science
        2. Arts/Crafts

        3. Music
    - C. Shops for Vocational/Industrial Arts and Business
    - D. Special Education

3. There is no difference between the standards for educational space recommended by practitioners and those recommended by the literature with respect to:
    - A. General Classrooms
        1. Elementary
        2. Middle School and Junior High
        3. High School
    - B. Laboratories
        1. Science
        2. Arts/Crafts
        3. Music
    - C. Vocational/Industrial Arts Areas
        1. Shops
    - D. Business Education
    - E. Special Education

Participants

There were two categories of survey participants used in this study. One category consisted of facility experts. They were used to verify and modify the standards for educational space derived from the literature reviewed. The information gathered from these surveys was considered to be literature for the purpose of this study. The other category of participants consisted of Texas school district superintendents or their designees. These superintendents were used to provide practitioner input into the development of the recommended standards of educational space.

Procedure

Selection of Educational Spaces

The general educational spaces of prekindergarten, kindergarten, grades 1-4, grades 5-6, art, and music were selected for study in the area of elementary education because of their prevalence in the instructional setting. The division of elementary grades 1-4 and 5-6 were made due to the state mandated pupil-teacher ratio in grades four down. The separation of prekindergarten and kindergarten was made due to the differentiation exhibited by the literature for these spaces or the absence of attention to these spaces by the literature.

The general classroom (grades 6-9), science, art, choral music, instrumental music, and homemaking were selected for study in the middle school/junior high area because of the prevalence of these spaces in the instructional setting.

The high school educational spaces of general classroom (grades 9-12); the science spaces of physical science, biology, chemistry, and physics; art; choral music; and instrumental music were selected because of the prevalence of these educational spaces in the instructional setting.

The shop and laboratory spaces selected in the vocational, industrial technology, and business areas were general production agriculture shop, home economics laboratory, and typing/word processing laboratory. These spaces were selected because at least three percent of the eligible student population participated in the programs yearly.

The special education spaces of educable mentally retarded, trainable mentally retarded, severely and profoundly retarded, physically handicapped, emotionally disturbed, and gifted and talented were selected because of their prevalence in the instructional setting.

While there are many additional educational settings existing in the public schools of Texas, this study was limited to the above mentioned educational spaces.

Data Gathering

A substantive review of the literature, coupled with a review of the standards utilized by other states, provided the basis for the survey instrument developed by the researcher. The instrument was then presented to three experts, selected by peer recommendation, for their scrutiny, modification, and completion.

The instrument, once modified, was then presented to practitioners who were selected through a stratified random sample based on district pupil population and district wealth.

Selection of Participants

Superintendents, or their designees, from 120 school districts were selected for this study using a stratified random sample. These practitioners were selected from school districts in the State of Texas. There are 1,055 school districts in Texas which served as a basis for stratification by pupil population and wealth.

School districts were grouped by pupil population on the basis of their 1988-89 enrollments. The grouping scheme used by the Texas Education Agency for comparing district performance was used for this study. The criteria for stratification were:

1. Pupil population. The school districts were subdivided into four categories of pupil population. These categories were: a) 10,000 or more; b) 3,000 to 9,999; c) 1,000 to 2,999; and d) 999 or less.
2. Wealth per student. The school districts were grouped according to wealth per student. These categories were a) wealth above the state average and b) wealth below the state average. The average wealth per student used for this study was from the 1988-89 school year. The average

wealth per student figure used was $198,732, as reported by the Texas Research League in Bench Marks: 1988-89 School District Budgets in Texas (August, 1989).

The school districts were alphabetized according to the groupings of wealth and pupil population. The number of districts eligible for selection by group were as indicated in Table 3-1.

Table 3-1

Wealth and Pupil Population Groupings

Enrollment Category	Wealth to State Average	Number of Districts	Total Enrollment
10,000 or more	above	28	1,013,301
10,000 or more	below	39	899,332
3,000 to 9,999	above	38	196,844
3,000 to 9,999	below	100	489,522
1,000 to 2,999	above	66	112,778
1,000 to 2,999	below	176	308,482
999 or less	above	218	62,575
999 or less	below	390	183,743
	Totals	1,055	3,266,577

To identify the districts to be selected, a random selection of 15 school districts from each category was made. As indicated in Table 3-2, the percentage of eligible districts selected ranged from 3.8 to 53.6.

Table 3-2

Eligibility Groupings

Enrollment Category	Wealth to State Avg.	Districts Eligible	Sample n	% of Eligible
10,000 or more	Above	28	15	53.6
10,000 or more	Below	39	15	38.5
3,000 to 9,999	Above	38	15	39.5
3,000 to 9,999	Below	100	15	15.0
1,000 to 2,999	Above	66	15	22.7
1,000 to 2,999	Below	176	15	08.5
999 or less	Above	218	15	06.9
999 or less	Below	390	15	03.8

Instructions to Participants

The three facility experts and the 120 practitioners were asked to complete a survey which described the standards for educational space developed through a substantive review of both the standards used by other states and the literature. The metric used for the survey was square footage per educational space.

Data Treatments

Surveys were collected from 79 of the 120 eligible school district practitioners. Of the 79 surveys collected, six were unable to be used. The percentage of survey instruments collected ranged from 53.3 percent in the group with above state average wealth and enrollment of 1,000 to 2,999 to the group of above state average wealth with enrollment of 10,000 or more, which tallied an 80.0 percent return. The return rates for all groups is reflected in Table 3-3.

Table 3-3

Percentage of Survey Returns

Enrollment Category	Wealth to State Average	Number	% of Return
10,000 or more	Above	12	80.0
10,000 or more	Below	11	73.3
3,000 to 9,999	Above	10	66.7
3,000 to 9,999	Below	10	66.7
1,000 to 2,999	Above	8	53.3
1,000 to 2,999	Below	9	60.0
999 or less	Above	10	66.7
999 or less	Below	9	60.0

Following the collection of data, typical data preparation procedures were employed. The data was first entered into the computer to allow computerized analyses of the information. Secondly, preliminary data analyses were undertaken to examine the data. These analyses included frequency distributions, mean and modality determinations, and other descriptive statistics which ascertained the appropriateness of inferential tests of significance. The data received was ratio in nature.

The one-way analysis of variance procedure was used to determine if there were any differences between the perceptions of superintendents from below state average wealth school districts and above state average wealth school districts pertaining to the square footage viewed as necessary for an adequate education in the selected spaces.

The Mann-Whitney U test was used to discover differences between the perceptions of superintendents from districts of varying enrollment groups pertaining to the square footage necessary for an adequate education in the selected spaces. This test was selected due to the limited degree of homogeneity of variance between the groups.

The Mann-Whitney U test was also used to discover differences between the perceptions of the surveyed practitioners and those of the literature pertaining to the necessary square footage needed for an adequate education in the selected spaces. This test was

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chosen due to the limited degree of homogeneity of variance between the two groups.

CHAPTER FOUR

Introduction

The data obtained from the survey of superintendent perceptions of the total square footage needed to provide an adequate education in specified educational areas are presented in Chapter Four. The data are presented and discussed as they relate to the three null hypotheses presented in Chapter Three. The reply from a comment analysis describing the salient points, as reported by participating superintendents, which guided their responses is also presented.

The null hypotheses addressed are as follows:

1. There is no difference between the standards recommended by practitioners, in school districts with above average wealth and those of below average wealth, pertaining to educational space for:

   Elementary Spaces

   1. Prekindergarten
   2. Kindergarten
   3. Grades one through four
   4. Grades five and six
   5. Elementary art
   6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound

27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

2. There is no difference between the standards for educational space recommended by practitioners, from school districts of various enrollment groups, for :

Elementary Spaces

1. Prekindergarten
2. Kindergarten
3. Grades one through four
4. Grades five and six
5. Elementary art
6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology

16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

3. There is no difference between the standards for educational space recommended by practitioners and those recommended by the literature with respect to:

Elementary Spaces

1. Prekindergarten
2. Kindergarten
3. Grades one through four
4. Grades five and six

5. Elementary art
6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded

25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

Organization of the Chapter

To concisely present the data needed to address the study, this chapter is divided into four sections. The first section describes the demographics of the survey sample; the second section addresses the statistical procedures used in the analyses; section three reports the responses to the survey; and section four addresses the three null hypotheses. The data is described in both narrative and in tabular form.

Demographics of the Sample

Participants were randomly selected from the population of superintendents in the state of Texas. The population was categorized by school district wealth and enrollment prior to selection by random sample. This procedure produced the following groupings of respondents:

1. Enrollment of 10,000 or more and wealth below state average.

2. Enrollment of 10,000 or more and wealth above state average.
3. Enrollment of 3,000 to 9,999 and wealth below state average.
4. Enrollment of 3,000 to 9,999 and wealth above state average.
5. Enrollment of 1,000 to 2,999 and wealth below state average.
6. Enrollment of 1,000 to 2,999 and wealth above state average.
7. Enrollment of 999 or less and wealth below state average.
8. Enrollment of 999 or less and wealth above state average.

The original sample contained 15 superintendents within each of the above categories. There were 120 superintendents eligible to participate in the original sample. Each invited participant was mailed a cover letter describing the study (appendix C), a letter explaining the need and purpose of the study (appendix D), and a copy of the survey instrument (appendix E).

Wealth

The available population of districts were divided into two wealth categories -- above state average wealth per pupil and below state average wealth per pupil (appendix A). The first category, below average wealth per pupil, was comprised of 705 school districts from which 60 were selected for the study sample. The second category, above average wealth, was comprised of 350 school districts from which 60 were selected for the study sample (appendix B). The figure for average state wealth used for this study was $198,732 per student (Bench Marks: 1988-89 School District Budgets in Texas, 1989).

Enrollment

The available population of districts were divided into four categories according to enrollment. The first category, 10,000 students or more, contained a population of 67 school districts from which 30 were selected for the study sample (appendix B). The second category, 3,000 to 9,999 students, was comprised of a population of 138 school districts from which 30 were selected for the study sample (appendix B). The third category, 1,000 to 2,999, had an available population of 242 school districts from which 30 were selected for the study sample (appendix B). The final category, 999 or less students, contained an available population of 608 school districts from which 30 were selected for the study sample (appendix B).

Superintendent Experience

Of the 73 superintendents who responded to the survey, 53 reported their years of experience in the position of superintendent for a utilization rate of 72.6 percent. The mean years of experience in the capacity of superintendent was 8.2 years. The variation in years of experience ranged from less than one year to 29 years.

Experience in Planning Educational Space

Of the 73 superintendents who responded to the survey, 54 reported their years of experience in planning educational space for a utilization rate of 73.9 percent. Four of the superintendents reported they did not have any prior experience in the planning of educational space. The mean years of experience in the capacity of superintendent for those with planning experience was 8.6 years. The variation in planning experience ranged from one year to 29 years. The mean years of experience for those superintendents with no planning experience was 3.8 years. The variation for superintendents with no planning experience ranged from one year to seven years.

Distribution by Wealth and Enrollment

The total sample included 120 Texas school district superintendents. They were divided equally into categories of wealth and enrollment as previously stated. The 73 participating superintendents are presented below by their enrollment and wealth groups in Tables 4-1 and 4-2, respectively.

Table 4-1
District Enrollment of Superintendent Respondents

	≥10,000+	3,000-9,999	1,000-2,999	≤999
Eligible	30	30	30	30
Participants	23	18	16	16

Table 4-2
District Wealth of Superintendent Respondents

	Above State Average	Below State Average
Eligible	60	60
Participants	37	36

Statistical Procedures

The mean square footage was calculated for each educational space variable in order to compare differences in perceptions in the selected educational spaces by the participating superintendents. In addition, the mean square footage was calculated by wealth and enrollment for each educational space category.

To address the following null hypothesis, a series of one-way Analysis of Variance (ANOVA) tests were used. The F-test was used to indicate significant differences between the means of the two wealth groups (above and below state average) for each educational space variable. The F-test allowed the determination of significant differences between the two groups of wealth for each educational space variable. The level of significance used for these analyses was 0.05. The null hypothesis which was addressed with this technique stated:

> There is no difference between the standards recommended by practitioners from school districts with above average wealth and from those with below average wealth for the following educational spaces:
>
> Elementary Spaces
>
> 1. Prekindergarten
> 2. Kindergarten
> 3. Grades one through four
> 4. Grades five and six
> 5. Elementary art
> 6. Elementary music
>
> Junior High/Middle School Spaces
>
> 7. General classroom
> 8. Science
> 9. Art
> 10. Choral music
> 11. Instrumental music
> 12. Homemaking labpratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

The analyses were conducted in the following order:

Elementary Spaces

1. Prekindergarten by wealth group
2. Kindergarten by wealth group

3. Grades one through four by wealth group
4. Grades five and six by wealth group
5. Art by wealth group
6. Music by wealth group

Junior High/Middle School Spaces

7. General classroom by wealth group
8. Science by wealth group
9. Art by wealth group
10. Choral music by wealth group
11. Instrumental music by wealth group
12. Homemaking laboratory by wealth group

High School Spaces

13. General classroom by wealth group
14. Physical science by wealth group
15. Biology by wealth group
16. Chemistry by wealth group
17. Physics by wealth group
18. Art by wealth group
19. Choral music by wealth group
20. Instrumental music by wealth group

Vocational/Industrial and Business Spaces

21. Home economics by wealth group
22. General agriculture shop by wealth group
23. Typing/Word processing by wealth group

Special Education Spaces

24. Educable mentally retarded by wealth group
25. Trainable mentally retarded by wealth group
26. Severe and profound by wealth group
27. Physically handicapped by wealth group
28. Emotionally disturbed by wealth group
29. Gifted and talented by wealth group

The Mann-Whitney U test was selected to address the following null hypothesis. This technique was chosen because of the limited degree of homoscedasticity between the two wealth categories. A series of Mann-Whitney U analyses were used to test the following null hypothesis:

> There is no difference between the standards recommended by practitioners from school districts of varying categories of pupil enrollment pertaining to educational space for:
>
> Elementary Spaces
>
> 1. Prekindergarten
> 2. Kindergarten
> 3. Grades one through four
> 4. Grades five and six
> 5. Elementary art
> 6. Elementary music
>
> Junior High/Middle School Spaces
>
> 7. General classroom

8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound

27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

The Mann-Whitney U analyses were conducted for enrollment group 1 (10,000 or more), enrollment group 2 (3,000 to 9,999), enrollment group 3 (1,000 to 2,999), and enrollment group 4 (999 or less). Each enrollment group was compared to the others in the following order: group 1 with group 2; group 1 with group 3; group 1 with group 4; group 2 with group 3; group 2 with group 4; and group 3 with group 4. The level of significance used for these analyses was 0.01.

The variables were examined for each of the above pairings in the following order:

Elementary Spaces

1. Prekindergarten by enrollment group
2. Kindergarten by enrollment group
3. Grades one through four by enrollment group
4. Grades five and six by enrollment group
5. Art by enrollment group
6. Music by enrollment group

Junior High/Middle School Spaces

7. General classroom by enrollment group
8. Science by enrollment group
9. Art by enrollment group

10. Choral music by enrollment group
11. Instrumental music by enrollment group
12. Homemaking laboratory by enrollment group

High School Spaces

13. General classroom by enrollment group
14. Physical science by enrollment group
15. Biology by enrollment group
16. Chemistry by enrollment group
17. Physics by enrollment group
18. Art by enrollment group
19. Choral music by enrollment group
20. Instrumental music by enrollment group

Vocational/Industrial and Business Spaces

21. Home economics by enrollment group
22. General agriculture shop by enrollment group
23. Typing/Word processing by enrollment group

Special Education Spaces

24. Educable mentally retarded by enrollment group
25. Trainable mentally retarded by enrollment group
26. Severe and profound by enrollment group
27. Physically handicapped by enrollment group
28. Emotionally disturbed by enrollment group
29. Gifted and talented by enrollment group

Report on the Responses to the Survey

The survey was designed to gather information about superintendents' perceptions pertaining to the square footage needed to provide an adequate education in selected educational spaces.

Responses of the Total Population

Seventy nine (65.8%) of the 120 superintendents selected in the original sample participated in the study. Of the 79 respondents, six surveys (7.6%) were not useable. There were also portions of some surveys which were unable to be used because several participants failed to respond to all of the survey questions.

Responses by Wealth Group

Of the 73 useable responses, 36 were from superintendents of below average wealth school districts and 37 were from above average wealth school districts. Tables 4-3 and 4-4 reflect the number of responses, mean square footage, and standard deviation for each educational space by wealth grouping, respectively.

Responses by Enrollment Group

Of the 73 useable responses, 23 were from superintendents of districts with an enrollment of 10,000 students or more; 18 were from superintendents of districts with enrollments ranging from

3,000 to 9,999 students; 16 were from superintendents from districts with enrollments ranging from 1,000 to 2,999 students; and 16 were from superintendents from districts with enrollments of 999 students or less. Tables 4-5, 4-6, 4-7, and 4-8 reflect the number of responses, mean square footage, and standard deviation for each educational space by enrollment grouping, respectively.

Table 4-3

Number, Mean Square Footage, and Standard Deviation of Respondents' Perceptions of Educational Spaces in the Below Average Wealth Category

Educational Space	N	Mean Sq.Ft.	S.D.
Elementary Spaces			
Prekindergarten	35	890	200
Kindergarten	36	882	204
Grades 1-4	36	788	126
Grades 5-6	36	793	120
Art	33	997	241
Music	34	1122	503
Junior High/Middle School Spaces			
General Classroom (Grades 6-9)	35	782	155
Science	36	1129	318
Art	36	1054	292
Choral Music	34	1161	370
Instrumental Music	36	1681	969
Homemaking Laboratory	31	1498	754
High School Spaces			
General Classroom (Grades 9-12)	34	798	112
Physical Science	37	1166	267
Biology	36	1173	302
Chemistry	36	1246	330
Physics	35	1223	338
Art	37	1264	524
Choral Music	35	1637	737
Instrumental Music	36	2441	1204
Vocational/Industrial/Business			
Home Economics	36	1712	860
General Agriculture Shop	34	2358	1091
Typing/Word Processing	36	1078	292
Special Education Spaces			
Educable Mentally Retarded	33	806	297
Trainable Mentally Retarded	34	858	357
Severe and Profound	34	1028	622
Physically Handicapped	33	976	410
Emotionally Disturbed	33	885	351
Gifted and Talented	33	763	270

Table 4-4

Number, Mean Square Footage, and Standard Deviation of Respondents' Perceptions of Educational Spaces in the Above Average Wealth Category

Educational Space	N	Mean Sq.Ft.	S.D.
Elementary Spaces			
Prekindergarten	36	880	216
Kindergarten	37	891	216
Grades 1-4	37	807	208
Grades 5-6	37	806	205
Art	36	1022	316
Music	37	1019	331
Junior High/Middle School Spaces			
General Classroom (Grades 6-9)	37	802	253
Science	37	1075	308
Art	36	1144	401
Choral Music	37	1147	433
Instrumental Music	37	1605	683
Homemaking Laboratory	33	1304	439
High School Spaces			
General Classroom (Grades 9-12)	37	809	212
Physical Science	35	1191	429
Biology	35	1239	426
Chemistry	35	1239	421
Physics	35	1211	425
Art	35	1221	404
Choral Music	35	1487	686
Instrumental Music	35	2392	1049
Vocational/Industrial/Business			
Home Economics	34	1597	754
General Agriculture Shop	31	2193	1137
Typing/Word Processing	34	1221	512
Special Education Spaces			
Educable Mentally Retarded	37	832	320
Trainable Mentally Retarded	37	868	334
Severe and Profound	37	898	391
Physically Handicapped	36	891	356
Emotionally Disturbed	37	834	319
Gifted and Talented	36	746	257

Table 4-5

Number, Mean Square Footage, and Standard Deviation of Respondents' Perceptions of Educational Spaces in the Enrollment Category of 10,000 or More

Educational Space	N	Mean Sq.Ft.	S.D.
Elementary Spaces			
Prekindergarten	22	840	131
Kindergarten	23	843	150
Grades 1-4	23	732	72
Grades 5-6	23	762	91
Art	21	977	197
Music	22	981	205
Junior High/Middle School Spaces			
General Classroom (Grades 6-9)	23	783	114
Science	23	1135	221
Art	23	1166	282
Choral Music	23	1183	366
Instrumental Music	23	1604	773
Homemaking Laboratory	21	1519	556
High School Spaces			
General Classroom (Grades 9-12)	23	791	124
Physical Science	22	1206	270
Biology	22	1231	284
Chemistry	22	1307	312
Physics	21	1259	327
Art	22	1328	374
Choral Music	22	1870	911
Instrumental Music	22	2693	1119
Vocational/Industrial/Business			
Home Economics	22	1878	819
General Agriculture Shop	20	2116	993
Typing/Word Processing	22	1116	393
Special Education Spaces			
Educable Mentally Retarded	22	857	296
Trainable Mentally Retarded	22	908	322
Severe and Profound	22	1058	587
Physically Handicapped	21	990	401
Emotionally Disturbed	22	945	349
Gifted and Talented	20	693	163

Table 4-6

Number, Mean Square Footage, and Standard Deviation of Respondents' Perceptions of Educational Spaces in the Enrollment Category of 3,000 to 9,999

Educational Space	N	Mean Sq.Ft.	S.D.
Elementary Spaces			
Prekindergarten	18	900	180
Kindergarten	18	889	158
Grades 1-4	18	823	128
Grades 5-6	18	809	127
Art	16	992	202
Music	17	1091	281
Junior High/Middle School Spaces			
General Classroom (Grades 6-9)	18	753	188
Science	18	1015	329
Art	18	1087	447
Choral Music	18	1232	471
Instrumental Music	18	1709	768
Homemaking Laboratory	16	1436	623
High School Spaces			
General Classroom (Grades 9-12)	18	819	118
Physical Science	17	1150	302
Biology	17	1204	295
Chemistry	17	1248	294
Physics	17	1199	305
Art	17	1389	631
Choral Music	17	1594	455
Instrumental Music	17	2715	1090
Vocational/Industrial/Business			
Home Economics	17	1658	909
General Agriculture Shop	15	2605	1363
Typing/Word Processing	17	1100	317
Special Education Spaces			
Educable Mentally Retarded	18	794	196
Trainable Mentally Retarded	18	879	298
Severe and Profound	18	1041	615
Physically Handicapped	18	1000	402
Emotionally Disturbed	18	851	312
Gifted and Talented	18	781	157

Table 4-7

Number, Mean Square Footage, and Standard Deviation of Respondents' Perceptions of Educational Spaces in the Enrollment Category of 1,000 to 2,999

Educational Space	N	Mean Sq.Ft.	S.D.
Elementary Spaces			
Prekindergarten	16	869	103
Kindergarten	16	880	162
Grades 1-4	16	816	130
Grades 5-6	16	787	128
Art	16	1022	288
Music	16	1014	289
Junior High/Middle School Spaces			
General Classroom (Grades 6-9)	16	770	71
Science	16	1153	256
Art	15	1053	194
Choral Music	15	1070	221
Instrumental Music	16	1538	468
Homemaking Laboratory	13	1202	392
High School Spaces			
General Classroom (Grades 9-12)	15	748	62
Physical Science	17	1141	361
Biology	16	1137	373
Chemistry	16	1137	373
Physics	16	1141	371
Art	17	1062	257
Choral Music	16	1267	460
Instrumental Music	16	1741	646
Vocational/Industrial/Business			
Home Economics	16	1443	544
General Agriculture Shop	15	2396	1174
Typing/Word Processing	16	1140	297
Special Education Spaces			
Educable Mentally Retarded	14	792	346
Trainable Mentally Retarded	15	812	386
Severe and Profound	15	818	351
Physically Handicapped	14	824	331
Emotionally Disturbed	14	760	264
Gifted and Talented	15	772	291

Table 4-8

Number, Mean Square Footage, Standard Deviation of Respondents' Perceptions of Educational Spaces in the Enrollment Category of 999 or Less

Educational Space	N	Mean Sq.Ft.	S.D.
Elementary Spaces			
Prekindergarten	15	950	359
Kindergarten	16	958	337
Grades 1-4	16	842	298
Grades 5-6	16	854	287
Art	16	1060	422
Music	16	1218	753
Junior High/Middle School Spaces			
General Classroom (Grades 6-9)	15	878	379
Science	16	1101	441
Art	16	1061	444
Choral Music	15	1100	508
Instrumental Music	16	1724	1235
Homemaking Laboratory	14	1357	837
High School Spaces			
General Classroom (Grades 9-12)	15	860	304
Physical Science	16	1211	521
Biology	16	1239	527
Chemistry	16	1254	521
Physics	16	1256	528
Art	16	1165	510
Choral Music	15	1387	710
Instrumental Music	16	2396	1320
Vocational/Industrial/Business			
Home Economics	15	1556	892
General Agriculture Shop	15	2055	901
Typing/Word Processing	15	1258	633
Special Education Spaces			
Educable Mentally Retarded	16	821	403
Trainable Mentally Retarded	16	834	394
Severe and Profound	16	868	400
Physically Handicapped	16	873	382
Emotionally Disturbed	16	833	386
Gifted and Talented	16	784	403

Categorical Description

The study examined five categories of educational space. These categories of educational space were elementary educational spaces, junior high and middle school, high school, vocational/industrial and business, and special education. Each of the categories were divided into specified subcategories of educational space for analysis.

The participants were asked to briefly describe the factors taken into consideration when making their recommendations for the square footage needed to provide an adequate education in each of the educational space variables considered. An analysis of these comments accompany the categorical description of each space variable. The comment analysis is broad in scope and does not include wealth or enrollment considerations.

Elementary Educational Spaces

The category of elementary educational spaces was subdivided into six areas for analysis. These areas were prekindergarten, kindergarten, grades one through four, grades five and six, elementary art, and elementary music.

Prekindergarten

Responses (n=71) for the educational space of a prekindergarten classroom ranged from 250 square feet (response from a kindergarten to grade eight district with 16 children) to 1,600 square feet. The mean square footage of these responses was 885 square feet with a median of 900 square feet and a mode of 900 square feet. The standard deviation was 206.6 square feet.

When broken into the two groups of wealth, the responses (n=35) from the below average wealth school districts yielded a mean of 890 square feet, a median of 900 square feet, and a mode of 900 square feet. The responses from the below average wealth group yielded a standard deviation of 200.0 square feet. The responses (n=36) from the above average wealth school district group yielded a mean of 880 square feet, a median of 873 square feet, and a mode of 750 square feet. The standard deviation for the above average wealth group was 215.6 square feet.

An analysis of the responses (n=22) from the enrollment category of 10,000 or more yielded a mean of 840 square feet, a median of 883 square feet, and a mode of 900 square feet. The standard deviation was 130.9 square feet.

An analysis of the responses (n=18) from the enrollment category of 3,000 to 9,999 yielded a mean of 900 square feet, a median of 890 square feet, and a mode of 750 square feet. The standard deviation was 180.0 square feet.

An analysis of the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 869 square feet, the median was 888 square feet, and the mode was 900 square feet. The standard deviation was 102.7 square feet.

An analysis of the responses (n=15) from the enrollment category of 999 or less yielded a mean of 950 square feet, a median of 900 square feet, and a mode of 900 square feet. The standard deviation was 358.6 square feet.

Table 4-9

Number, Mean, Median, and Standard Deviation for Prekindergarten Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	35	890	900	200.0
Above Average	36	880	873	215.6
Enrollment				
10,000 or More	22	840	883	130.9
3,000 to 9,999	18	900	890	180.0
1,000 to 2,999	16	869	888	102.7
999 or less	15	950	900	358.6
Total Respondents	71	885	900	206.6

An analysis of the comments revealed that the participants reported instructional considerations as the primary factor in their recommendations. The type of activity and differentiated teaching methods, such as learning centers, were also reported as important considerations. In addition, storage, type of furniture, and student factors were mentioned.

Kindergarten

An analysis of the responses (n=73) for the educational space of a kindergarten classroom indicated that the square footage perceived by superintendents as necessary for an adequate education ranged from 250 square feet (response from a kindergarten to grade eight district with 16 children) to 1,600 square feet. The responses yielded a mean of 888 square feet, a median of 900 square feet, and a mode of 900 square feet. The standard deviation was 209.0 square feet.

When broken into the two groups of wealth, the results of the respondents (n=36) from the below average wealth school districts yielded a mean of 882 square feet, a median of 900 square feet, and a mode of 900 square feet. The below average wealth group had a standard deviation of 204.0 square feet. The results of the responses (n=37) from the above average wealth school district group showed a mean of 893 square feet, a median of 880 square feet, and a mode of 750 square feet. The standard deviation for the above average wealth group was 216.4 square feet.

An analysis of the responses (n=23) from the enrollment category of 10,000 or more yielded a mean of 843 square feet, a median of 865 square feet, and a mode of 900 square feet. The standard deviation was 150.3 square feet.

An analysis of the responses (n=18) from the enrollment category of 3,000 to 9,999 yielded a mean of 889 square feet, a median of 872 square feet, and a mode of 750 square feet. The standard deviation was 157.7 square feet.

An analysis of the responses (n=16) from the enrollment category of 1,000 to 2,999 yielded a mean of 880 square feet, a median of 900 square feet, and a mode of 900 square feet. The standard deviation was 161.2 square feet.

An analysis of the responses (n=16) from the enrollment category of 999 or less yielded a mean of 958 square feet, a median of 900 square feet, and a mode of 900 square feet. The standard deviation was 337.5 square feet.

Table 4-10

Number, Mean, Median, and Standard Deviation for Kindergarten Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	882	900	204.0
Above Average	37	893	880	216.4
Enrollment				
10,000 or More	23	843	865	150.3
3,000 to 9,999	18	889	872	157.7
1,000 to 2,999	16	880	900	161.2
999 or less	16	958	900	337.5
Total Respondents	73	888	900	209.0

The comment analysis revealed that instructional concerns were primary factors in the participants' recommendations. Learning centers, group instruction (both large and small), space

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for manipulatives, learning environment organization, and space for projects were all mentioned as important factors.

Other factors considered were the spatial needs for furniture, student movement, student activities, and storage.

Grades 1-4

Responses (n=73) for the educational space of classrooms in grades one through four ranged from a low of 200 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 1,600 square feet. An analysis of the responses yielded a mean of 797 square feet, a median of 750 square feet, and a mode of 750 square feet. The standard deviation was 171.9 square feet.

When broken into the two groups of wealth, respondents (n=36) from the below average wealth school districts had a mean of 788 square feet, a median of 760 square feet, and a mode of 750 square feet. The below average wealth group had a standard deviation of 126.4 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 807 square feet, a median of 750 square feet, and a mode of 750 square feet. The standard deviation for the above average wealth group was 208.3 square feet.

When the responses (n=23) from the enrollment category of 10,000 or more were analyzed, the mean was 732 square feet, the median was 750 square feet, and the mode was 750 square feet. The standard deviation was 72.3 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 823 square feet, a median of 795 square feet, and a mode of 750 square feet. The standard deviation was 128.4 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 816 square feet, the median was 763 square feet, and the mode was 750 square feet. The standard deviation was 130.2 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 842 square feet, a median of 825 square feet, and a mode of 900 square feet. The standard deviation was 297.9 square feet.

Table 4-11

Number, Mean, Median, and Standard Deviation for Grades 1-4 Educational Space by Wealth Groupings Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	788	760	126.4
Above Average	37	807	750	208.3
Enrollment				
10,000 or More	23	732	750	72.3
3,000 to 9,999	18	823	795	128.4
1,000 to 2,999	16	816	763	130.2
999 or less	16	842	825	297.9
Total Respondents	73	797	750	171.9

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The comment analysis revealed that the primary considerations for recommendations were instructionally related. The concerns included the type of activities, group instruction (both large and small), space for manipulatives, learning environment organization, and space for projects.

Other factors considered were the spatial needs for furniture, student movement, and storage.

Grades 5-6

An analysis of the responses (n=73) for the educational space of classrooms in grades five and six ranged from a low of 160 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 1,600 square feet. The analysis yielded a mean of 799 square feet, a median of 760 square feet, and a mode of 750 square feet. The standard deviation was 167.6 square feet.

When broken into the two groups of wealth, respondents (n=36) from the below average wealth school districts had a mean of 793 square feet, a median of 760 square feet, and a mode of 750 square feet. The below average wealth group had a standard deviation of 119.6 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 806 square feet, a median of 750 square feet, and a mode of 750 square feet. The

standard deviation for the above average wealth group was 205.5 square feet.

When the responses (n=23) from the enrollment category of 10,000 or more were analyzed, the mean was 762 square feet, the median was 750 square feet, and the mode was 750 square feet. The standard deviation was 91.1 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 809 square feet, a median of 770 square feet, and a mode of 750 square feet. The standard deviation was 127.3 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 787 square feet, the median was 750 square feet, and the mode was 750 square feet. The standard deviation was 127.7 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 854 square feet, a median of 825 square feet, and a mode of 760 square feet. The standard deviation was 287.0 square feet.

Table 4-12

Number, Mean, Median, and Standard Deviation for Grades 5-6 Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	793	760	119.6
Above Average	37	806	750	205.5
Enrollment				
10,000 or More	23	762	750	91.1
3,000 to 9,999	18	809	770	127.3
1,000 to 2,999	16	787	750	127.7
999 or less	16	854	825	287.0
Total Respondents	73	799	760	167.6

The comment analysis revealed that instructional concerns were the driving forces behind the participants' recommendations. Space for varied activities, group instruction (both large and small), and space for projects were all mentioned as important factors.

Other factors considered were the spatial needs for furniture, student movement, student activities, and storage. In addition, the difference in student size from the lower grades was a factor.

Elementary Art

An analysis of the responses (n=69) for the educational space of an elementary art classroom ranged from a low of 200 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 2,000 square feet. Further analysis of the responses yielded a mean of 1,010 square feet, a median of 1,000 square feet, and a mode of 1,000 square feet. The standard deviation was 281.1 square feet.

When broken into the two groups of wealth, respondents (n=33) from the below average wealth school districts had a mean of 997 square feet, a median of 1,000 square feet, and a mode of 900 square feet. The below average wealth group had a standard deviation of 241.2 square feet. The respondents (n=36) from the above average wealth school district group had a mean of 1,022 square feet, a median of 1,000 square feet, and a mode of 1,000 square feet. The standard deviation for the above average wealth group was 316.2 square feet.

When the responses (n=21) from the enrollment category of 10,000 or more were analyzed, the mean was 977 square feet, the median was 960 square feet, and the mode was 900 square feet. The standard deviation was 196.6 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=16) revealed a mean of 992 square feet, a median of 1,000 square feet, and a mode of 1,000 square feet. The standard deviation was 202.1 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,022 square feet, the median was 1,000 square feet, and the mode was 900 square feet. The standard deviation was 287.5 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 1,060 square feet, a median of 1,000 square feet, and a mode of 1,000 square feet. The standard deviation was 422.4 square feet.

Table 4-13

Number, Mean, Median, and Standard Deviation for
Elementary Art Educational Space by Wealth Groupings,
Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	33	997	1000	241.2
Above Average	36	1022	1000	316.2
Enrollment				
10,000 or More	21	977	960	196.6
3,000 to 9,999	16	992	1000	202.1
1,000 to 2,999	16	1022	1000	287.5
999 or less	16	1060	1000	422.4
Total Respondents	69	1010	1000	281.1

The comment analysis revealed that the variety of instructional activities and space needed for student work areas were the primary concerns in the participants' recommendations. In addition, space needed for furniture and equipment, such as worktables and kilns, were frequently mentioned. Also, the need for storage of materials and student projects were important factors.

Elementary Music

The responses (n=71) for the educational space of an elementary music classroom ranged from a low of 200 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 3,600 square feet. Further analysis revealed a mean of 1,068 square feet, a median of 1,000 square feet, and a mode of 900 square feet. The standard deviation was 422.3 square feet.

When broken into the two groups of wealth, respondents (n=34) from the below average wealth school districts had a mean of 1,122 square feet, a median of 1,000 square feet, and a mode of 900 square feet. The below average wealth group had a standard deviation of 503.0 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 1,019 square feet, a median of 1,000 square feet, and a mode of 900 square feet. The standard deviation for the above average wealth group was 331.0 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 981 square feet, the median was 925 square feet, and the mode was 900 square feet. The standard deviation was 205.0 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=17) revealed a mean of 1,091 square feet, a median of 1,000

square feet, and a mode of 900 square feet. The standard deviation was 280.6 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,014 square feet, the median was 950 square feet, and the mode was 900 square feet. The standard deviation was 289.4 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 1,218 square feet, a median of 1,090 square feet, and a mode of 1,000 square feet. The standard deviation was 752.9 square feet.

Table 4-14

Number, Mean, Median, and Standard Deviation for
Elementary Music Educational Space by Wealth Groupings,
Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	34	1122	1000	503.0
Above Average	37	1019	1000	331.0
Enrollment				
10,000 or More	22	981	925	205.0
3,000 to 9,999	17	1091	1000	280.6
1,000 to 2,999	16	1014	950	289.4
999 or less	16	1218	1090	752.9
Total Respondents	71	1068	1000	422.3

The comment analysis revealed that instructional and equipment concerns were primary factors in the participants' recommendations. The space needed for instructional activities such as group work, performing area, and the need for student movement were reported as important in determining spatial requirements. Equipment needs such as risers and instruments were frequently cited. Also mentioned was a need for storage.

Junior High/Middle School Educational Spaces

General Classrooms (Grades 6-9)

Responses (n=72) for the educational space of a general classroom in a junior high or middle school ranged from 160 square feet (response from a kindergarten to grade eight district with 16 children) to 2,000 square feet. Further analysis yielded a mean of 793 square feet, a median of 768 square feet, and a mode of 750 square feet. The standard deviation was 209.5 square feet.

When broken into the two groups of wealth, respondents (n=35) from the below average wealth school districts had a mean of 782 square feet, a median of 775 square feet, and a mode of 750 square feet. The below average wealth group had a standard deviation of 154.7 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 802 square feet, a median of 750 square feet, and a mode of 750 square feet. The standard deviation for the above average wealth group was 252.6 square feet.

An analysis of the responses (n=23) from the enrollment category of 10,000 or more yielded a mean of 783 square feet, a median of 768 square feet, and a mode of 750 square feet. The standard deviation was 114.0 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 753 square feet, a median of 750 square feet, and a mode of 750 square feet. The standard deviation was 187.8 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 770 square feet, the median was 750 square feet, and the mode was 750 square feet. The standard deviation was 71.3 square feet.

An analysis of the enrollment category of 999 or less (n=15) revealed a mean of 878 square feet, a median of 840 square feet, and a mode of 900 square feet. The standard deviation was 378.8 square feet.

Table 4-15

Number, Mean, Median, and Standard Deviation for
Middle School/Junior High General Classroom Educational
Space by Wealth Groupings, Enrollment Groupings,
and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	35	782	775	154.7
Above Average	37	802	750	252.6
Enrollment				
10,000 or More	23	783	768	114.0
3,000 to 9,999	18	753	750	187.8
1,000 to 2,999	16	770	750	71.3
999 or less	15	878	840	378.8
Total Respondents	72	793	768	209.5

Comment analysis of the participants' recommendations revealed that student considerations and instructional concerns were primary factors in the square footage needed to provide an adequate education in the general classroom for the middle school/junior high area (grades 6-9). Student concerns included factors surrounding student size, number, and behavior patterns. Instructional considerations were adequate space for group work, learning centers, and teacher work areas. Also prevalent was a concern for adequate storage space.

Science

Responses (n=73) for the educational space of a junior high or middle school science classroom ranged from a low of 200 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 2,000 square feet. Further analysis yielded a mean of 1,102 square feet, a median of 1,100 square feet, and a mode of 1,200 square feet. The standard deviation was 312.2 square feet.

When broken into the two groups of wealth, respondents (n=36) from the below average wealth school districts had a mean of 1,129 square feet, a median of 1,150 square feet, and a mode of 1,200 square feet. The below average wealth group had a standard deviation of 318.5 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 1,075 square feet, a median of 1,100 square feet, and a mode of 1,200 square feet. The standard deviation for the above average wealth group was 307.8 square feet.

When the responses (n=23) from the enrollment category of 10,000 or more were analyzed, the mean was 1,135 square feet, the median was 1,200 square feet, and the mode was 1,200 square feet. The standard deviation was 220.9 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 1,015 square feet, a median of 1,100 square feet, and a mode of 1,200 square feet. The standard deviation was 329.3 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,153 square feet, the median was 1,146 square feet, and the mode was 900 square feet. The standard deviation was 255.8 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 1,101 square feet, a median of 1,050 square feet, and a mode of 1,000 square feet. The standard deviation was 440.8 square feet.

Table 4-16

Number, Mean, Median, and Standard Deviation for
Middle School/Junior High Science Educational
Space by Wealth Groupings, Enrollment Groupings,
and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	1129	1150	318.5
Above Average	37	1075	1100	307.8
Enrollment				
10,000 or More	23	1135	1200	220.9
3,000 to 9,999	18	1015	1100	329.3
1,000 to 2,999	16	1153	1146	255.8
999 or less	16	1101	1050	440.8
Total Respondents	73	1102	1100	312.2

The comment analysis revealed concerns relating to instruction, furniture, and storage. Primary instructional concerns included space for a variety of activities such as lectures, laboratories, demonstrations, and workspaces. Considerations of space for laboratory tables and the arrangement of furniture were also given priority by the participants.

Art

The responses (n=72) for the educational space of a junior high or middle school art classroom ranged from a low of 160 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 2,350 square feet. Further analysis yielded a mean of 1,099 square feet, a median of 1,036 square feet, and a mode of 1,000 square feet. The standard deviation was 351.6 square feet.

When broken into the two groups of wealth, respondents (n=36) from the below average wealth school districts had a mean of 1,054 square feet, a median of 1,000 square feet, and a mode of 1,000 square feet. The below average wealth group had a standard deviation of 292.4 square feet. The respondents (n=36) from the above average wealth school district group had a mean of 1,144 square feet, a median of 1,100 square feet, and a mode of 1,000 square feet. The standard deviation for the above average wealth group was 401.4 square feet.

When the responses (n=23) from the enrollment category of 10,000 or more were analyzed, the mean was 1,166 square feet, the median was 1,100 square feet, and the mode was 1,200 square feet. The standard deviation was 281.6 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 1,087 square feet, a median of 1,050 square feet, and a mode of 1,000 square feet. The standard deviation was 446.5 square feet.

When the responses (n=15) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,053 square feet, the median was 1,000 square feet, and the mode was 1,000 square feet. The standard deviation was 194.4 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 1,061 square feet, a median of 1,050 square feet, and a mode of 1,200 square feet. The standard deviation was 443.8 square feet.

Table 4-17

Number, Mean, Median, and Standard Deviation for Middle School/Junior High Art Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	1054	1000	292.4
Above Average	36	1144	1100	401.4
Enrollment				
10,000 or More	23	1166	1100	281.6
3,000 to 9,999	18	1087	1050	446.5
1,000 to 2,999	15	1053	1000	194.4
999 or less	16	1061	1050	443.8
Total Respondents	72	1099	1036	351.6

Analysis of the participants' comments pertaining to their recommendation for square footage in the area of art revealed considerations were given to furniture, instruction, equipment, and storage.

The arrangement and necessity of worktables was mentioned frequently. Also mentioned frequently was the need for space for special equipment such as kilns. Instructionally related items was the primary focus of participant comment. Adequate space for laboratory work and various activities was mentioned as well as space for the necessary materials and supplies.

Choral Music

The responses (n=71) for the educational space of a junior high or middle school choral music classroom ranged from a low of 160 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 2,350 square feet. Further analysis yielded a mean of 1,154 square feet, a median of 1,100 square feet, and a mode of 1,000 square feet. The standard deviation was 401.6 square feet.

When broken into the two groups of wealth, respondents (n=34) from the below average wealth school districts had a mean of 1,161 square feet, a median of 1,110 square feet, and a mode of 1,000 square feet. The below average wealth group had a standard deviation of 370.3 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 1,147 square feet, a median of 1,080 square feet, and a mode of 1,000 square feet. The standard deviation for the above average wealth group was 433.5 square feet.

When the responses (n=23) from the enrollment category of 10,000 or more were analyzed, the mean was 1,183 square feet, the median was 1,152 square feet, and the mode was 1,000 square feet. The standard deviation was 365.8 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 1,232 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The standard deviation was 471.0 square feet.

When the responses (n=15) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,070 square feet, the median was 1,000 square feet, and the mode was 1,000 square feet. The standard deviation was 221.0 square feet.

An analysis of the enrollment category of 999 or less (n=15) revealed a mean of 1,100 square feet, a median of 1,000 square feet, and a mode of 900 square feet. The standard deviation was 508.1 square feet.

Table 4-18

Number, Mean, Median, and Standard Deviation for Middle School/Junior High Choral Music Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	34	1161	1110	370.3
Above Average	37	1147	1080	433.5
Enrollment				
10,000 or More	23	1183	1152	365.8
3,000 to 9,999	18	1232	1200	471.0
1,000 to 2,999	15	1070	1000	221.0
999 or less	15	1100	1000	508.1
Total Respondents	71	1154	1100	401.6

The comment analysis showed participants were concerned about adequate space for equipment and instruction. Spatial needs for equipment such as risers was mentioned frequently, as was storage space. Concerns about the type of activity, instructional arrangement, and performing area were prevalent. Also mentioned as a consideration was the number of students in the class and office space.

Instrumental Music

The responses (n-73) for the educational space of a junior high or middle school instrumental music classroom ranged from a low of 300 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 5,600 square feet. Further analysis yielded a mean of 1,642 square feet, a median of 1,500 square feet, and a mode of 1,200 square feet. The standard deviation was 831.2 square feet.

When broken into the two groups of wealth, respondents (n-36) from the below average wealth school districts had a mean of 1,681 square feet, a median of 1,400 square feet, and a mode of 1,200 square feet. The below average wealth group had a standard deviation of 968.9 square feet. The respondents (n-37) from the above average wealth school district group had a mean of 1,605 square feet, a median of 1,500 square feet, and a mode of 1,500 square feet. The standard deviation for the above average wealth group was 682.7 square feet.

When the responses (n=23) from the enrollment category of 10,000 or more were analyzed, the mean was 1,604 square feet, the median was 1,500 square feet, and the mode was 1,000 square feet. The standard deviation was 772.8 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 1,709 square feet, a median of 1,575 square feet, and a mode of 1,500 square feet. The standard deviation was 768.2 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,538 square feet, the median was 1,375 square feet, and the mode was 1,200 square feet. The standard deviation was 468.1 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 1,724 square feet, a median of 1,400 square feet, and a mode of 1,100 square feet. The standard deviation was 1,235.3 square feet.

Table 4-19

Number, Mean, Median, and Standard Deviation for Middle School/Junior High Instrumental Music Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	1681	1400	968.9
Above Average	37	1605	1500	682.7
Enrollment				
10,000 or More	23	1604	1500	772.8
3,000 to 9,999	18	1709	1575	768.2
1,000 to 2,999	16	1538	1375	468.1
999 or less	16	1724	1400	1235.3
Total Respondents	73	1642	1500	831.2

A comment analysis of the space required to provide an adequate education for middle school/junior high instrumental music revealed concerns centering around instruction and equipment. Instructional factors listed were the type of activity, group work, and room to practice. The primary concern pertaining to equipment was for adequate space for instrument handling.

Storage was also mentioned as a factor for adequate space. In addition, the number of students in the class was also cited.

Homemaking Laboratory

The responses (n=64) for the educational space of a middle school or junior high homemaking laboratory ranged from a low of 300 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 4,000 square feet. Further analysis yielded a mean of 1,398 square feet, a median of 1,200 square feet, and a mode of 1,000 square feet. The standard deviation was 614.7 square feet.

When broken into the two groups of wealth, respondents (n=31) from the below average wealth school districts had a mean of 1,498 square feet, a median of 1,200 square feet, and a mode of 1,000 square feet. The below average wealth group had a standard deviation of 753.7 square feet. The respondents (n=33) from the above average wealth school district group had a mean of 1,304 square feet, a median of 1,200 square feet, and a mode of 900 square feet. The standard deviation for the above average wealth group was 438.6 square feet.

When the responses (n=21) from the enrollment category of 10,000 or more were analyzed, the mean was 1,519 square feet, the median was 1,400 square feet, and the mode was 1,400 square feet. The standard deviation was 555.8 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=16) revealed a mean of 1,436 square feet, a median of 1,188 square feet, and a mode of 900 square feet. The standard deviation was 623.1 square feet.

When the responses (n=13) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,202 square feet, the median was 1,000 square feet, and the mode was 1,000 square feet. The standard deviation was 391.7 square feet.

An analysis of the enrollment category of 999 or less (n=14) revealed a mean of 1,357 square feet, a median of 1,250 square feet, and a mode of 1,100 square feet. The standard deviation was 837.1 square feet.

Table 4-20

Number, Mean, Median, and Standard Deviation for Middle School/Junior High Homemaking Laboratory Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	31	1498	1200	753.7
Above Average	33	1304	1200	438.6
Enrollment				
10,000 or More	21	1519	1400	555.8
3,000 to 9,999	16	1436	1188	623.1
1,000 to 2,999	13	1202	1000	391.7
999 or less	14	1357	1250	837.1
Total Respondents	64	1398	1200	614.7

The comment analysis revealed that instructional concerns were primary factors in the participants' recommendations. The spaces needed to engage in the types of activities, demonstration area, space for group work, lecture, and hands-on laboratory work were the most cited concerns. In addition, adequate equipment and storage space were mentioned as important factors.

High School Educational Spaces

General Classrooms (Grades 9-12)

The responses (n=71) for the educational space of a general classroom at the high school level ranged from a low of 120 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 1,600 square feet. An analysis of the responses yielded a mean of 804 square feet, a median of 780 square feet, and a mode of 750 square feet. The standard deviation was 170.1 square feet.

When broken into the two groups of wealth, respondents (n=34) from the below average wealth school districts had a mean of 798 square feet, a median of 788 square feet, and a mode of 900 square feet. The below average wealth group had a standard deviation of 111.9 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 809 square feet, a median of 780 square feet, and a mode of 750 square feet. The standard deviation for the above average wealth group was 211.5 square feet.

When the responses (n=23) from the enrollment category of 10,000 or more were analyzed, the mean was 791 square feet, the median was 768 square feet, and the mode was 750 square feet. The standard deviation was 124.2 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 819 square feet, a median of 800 square feet, and a mode of 750 square feet. The standard deviation was 117.7 square feet.

When the responses (n=15) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 748 square feet, the median was 750 square feet, and the mode was 750 square feet. The standard deviation was 62.1 square feet.

An analysis of the enrollment category of 999 or less (n=15) revealed a mean of 860 square feet, a median of 850 square feet, and a mode of 900 square feet. The standard deviation was 304.3 square feet.

Table 4-21

Number, Mean, Median, and Standard Deviation for
High School General Classroom Educational
Space by Wealth Groupings, Enrollment Groupings,
and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	34	798	788	111.9
Above Average	37	809	780	211.5
Enrollment				
10,000 or More	23	791	768	124.2
3,000 to 9,999	18	819	800	117.7
1,000 to 2,999	15	748	750	62.1
999 or less	15	860	850	304.3
Total Respondents	71	804	780	170.1

Comment analysis revealed two major areas participants viewed as important in the space requirements for general classrooms at the high school level. These two broad areas centered around instruction and the students.

The instructional factors mentioned by the participants included space needs for learning centers, group work (both large and small), teacher work area, and activity space. The student related factors were predominantly related to the size of the students, as compared to the lower grades, and the number of students being served in a classroom.

Physical Science

The responses (n=72) for the educational space of a high school physical science classroom ranged from a low of 120 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 2,400 square feet. An analysis of the responses yielded a mean of 1,178 square feet, a median of 1,113 square feet, and a mode of 1,000 square feet. The standard deviation was 360.3 square feet.

When broken into the two groups of wealth, respondents (n=37) from the below average wealth school districts had a mean of 1,166 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The below average wealth group had a standard deviation of 286.5 square feet. The respondents (n=35) from the above average wealth school district group had a mean of 1,191 square feet, a median of 1,100 square feet, and a mode of 900 square feet. The standard deviation for the above average wealth group was 428.7 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 1,206 square feet, the median was 1,200 square feet, and the mode was 1,000 square feet. The standard deviation was 269.6 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=17) revealed a mean of 1,150 square feet, a median of 1,125 square feet, and a mode of 900 square feet. The standard deviation was 301.6 square feet.

When the responses (n=17) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,141 square feet, the median was 1,000 square feet, and the mode was 900 square feet. The standard deviation was 361.4 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 1,211 square feet, a median of 1,100 square feet, and a mode of 1,000 square feet. The standard deviation was 521.1 square feet.

Table 4-22

Number, Mean, Median, and Standard Deviation for
Physical Science Educational Space by Wealth Groupings,
Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	37	1166	1200	286.5
Above Average	35	1191	1100	428.7
Enrollment				
10,000 or More	22	1206	1200	269.6
3,000 to 9,999	17	1150	1125	301.6
1,000 to 2,999	17	1141	1000	361.4
999 or less	16	1211	1100	521.1
Total Respondents	72	1178	1113	360.3

The comments of practitioners pertaining the space needed to provide an adequate education for physical science, biology, chemistry, and physics were very similar and shall be combined into one analysis for high school science.

The most cited area of concern was in the arena of instruction. Space needed to provide for a variety of activities was the foremost mentioned factor in the consideration of participants. Also mentioned were the specific activity space needs for lecture, laboratory work, demonstration, group work, and project work.

Equipment and furniture needs were also frequently cited as spatial considerations in the participants' recommendations. In addition, the need for adequate storage space was cited.

Biology

The responses (n=71) for the educational space of a high school biology classroom ranged from a low of 180 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 2,400 square feet. An analysis of the responses yielded a mean of 1,205 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The standard deviation was 367.2 square feet.

When broken into the two groups of wealth, respondents (n=36) from the below average wealth school districts had a mean of 1,173 square feet, a median of 1,100 square feet, and a mode of 1,200 square feet. The below average wealth group had a standard deviation of 301.5 square feet. The respondents (n=35) from the above average wealth school district group had a mean of 1,239 square feet, a median of 1,200 square feet, and a mode of 900 square feet. The standard deviation for the above average wealth group was 426.3 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 1,231 square feet, the median was 1,200 square feet, and the mode was 1,200 square feet. The standard deviation was 283.5 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=17) revealed a mean of 1,204 square feet, a median of 1,200

square feet, and a mode of 1,200 square feet. The standard deviation was 295.2 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,137 square feet, the median was 980 square feet, and the mode was 900 square feet. The standard deviation was 372.9 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 1,239 square feet, a median of 1,100 square feet, and a mode of 1,100 square feet. The standard deviation was 526.9 square feet.

Table 4-23

Number, Mean, Median, and Standard Deviation for Biology Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	1173	1100	301.5
Above Average	35	1239	1200	426.3
Enrollment				
10,000 or More	22	1231	1200	283.5
3,000 to 9,999	17	1204	1200	295.2
1,000 to 2,999	16	1137	980	372.9
999 or less	16	1239	1100	526.9
Total Respondents	71	1205	1200	367.2

Chemistry

The responses (n=71) for the educational space of a high school chemistry science classroom ranged from a low of 180 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 2,400 square feet. An analysis of the responses yielded a mean of 1,243 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The standard deviation was 375.3 square feet.

When broken into the two groups of wealth, respondents (n=36) from the below average wealth school districts had a mean of 1,246 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The below average wealth group had a standard deviation of 330.4 square feet. The respondents (n=35) from the above average wealth school·district group had a mean of 1,239 square feet, a median of 1,200 square feet, and a mode of 1,000 square feet. The standard deviation for the above average wealth group was 421.4 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 1,307 square feet, the median was 1,365 square feet, and the mode was 1,200 square feet. The standard deviation was 311.9 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=17) revealed a mean of 1,248 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The standard deviation was 294.5 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,137 square feet, the median was 980 square feet, and the mode was 900 square feet. The standard deviation was 372.9 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 1,254 square feet, a median of 1,150 square feet, and a mode of 1,000 square feet. The standard deviation was 521.0 square feet.

Table 4-24

Number, Mean, Median, and Standard Deviation for
Chemistry Educational Space by Wealth Groupings,
Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	1246	1200	330.4
Above Average	35	1239	1200	421.4
Enrollment				
10,000 or More	22	1307	1365	311.9
3,000 to 9,999	17	1248	1200	294.5
1,000 to 2,999	16	1137	980	372.9
999 or less	16	1254	1150	521.0
Total Respondents	71	1243	1200	375.3

Physics

The responses (n=70) for the educational space of a high school physics classroom ranged from a low of 120 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 2,400 square feet. Analysis of the responses yielded a mean of 1,217 square feet, a median of 1,200

square feet, and a mode of 1,200 square feet. The standard deviation was 381.2 square feet.

When broken into the two groups of wealth, respondents (n=35) from the below average wealth school districts had a mean of 1,223 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The below average wealth group had a standard deviation of 338.1 square feet. The respondents (n=35) from the above average wealth school district group had a mean of 1,211 square feet, a median of 1,200 square feet, and a mode of 900 square feet. The standard deviation for the above average wealth group was 424.9 square feet.

When the responses (n=21) from the enrollment category of 10,000 or more were analyzed, the mean was 1,259 square feet, the median was 1,250 square feet, and the mode was 900 square feet. The standard deviation was 326.9 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=17) revealed a mean of 1,199 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The standard deviation was 304.6 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,141 square feet, the median was 980 square feet, and the mode was 900 square feet. The standard deviation was 370.6 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 1,256 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The standard deviation was 528.1 square feet.

Table 4-25

Number, Mean, Median, and Standard Deviation for Physics Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	35	1223	1200	338.1
Above Average	35	1211	1200	424.9
Enrollment				
10,000 or More	21	1259	1250	326.9
3,000 to 9,999	17	1199	1200	304.6
1,000 to 2,999	16	1141	980	370.6
999 or less	16	1256	1200	528.1
Total Respondents	70	1217	1200	381.2

Art

The responses (n=72) for the educational space of a high school art classroom ranged from a low of 180 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 3,600 square feet. Analysis of the responses yielded a mean of 1,243 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The standard deviation was 466.5 square feet.

When broken into the two groups of wealth, respondents (n=37) from the below average wealth school districts had a mean of 1,264 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The below average wealth group had a standard deviation of 523.7 square feet. The respondents (n=35) from the above average wealth school district group had a mean of 1,221 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The standard deviation for the above average wealth group was 403.9 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 1,328 square feet, the median was 1,225 square feet, and the mode was 1,200 square feet. The standard deviation was 373.9 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=17) revealed a mean of 1,389 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The standard deviation was 631.4 square feet.

When the responses (n=17) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,062 square feet, the median was 1,000 square feet, and the mode was 1,000 square feet. The standard deviation was 257.3 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 1,165 square feet, a median of 1,200 square feet, and a mode of 1,200 square feet. The standard deviation was 510.4 square feet.

Table 4-26

Number, Mean, Median, and Standard Deviation for High School Art Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	37	1264	1200	523.7
Above Average	35	1221	1200	403.9
Enrollment				
10,000 or More	22	1328	1225	373.9
3,000 to 9,999	17	1389	1200	631.4
1,000 to 2,999	17	1062	1000	257.3
999 or less	16	1165	1200	510.4
Total Respondents	72	1243	1200	466.5

The comment analysis revealed that adequate space for instruction, furniture, equipment, and storage were the primary considerations in the participants' recommendations. The instructional concerns cited revolved around the space needed to provide for a variety of activities, such as lecture, laboratory work, group work, and projects. The primary special equipment concern identified was that of space for a kiln.

Furniture needs were concerned about the space required for tables, drawing desks, and their arrangement. Also cited as a factor was space for storage.

Choral Music

The responses (n=70) for the educational space of a high school choral music classroom ranged from a low of 180 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 4,356 square feet. Analysis of the responses yielded a mean of 1,562 square feet, a median of 1,520 square feet, and a mode of 2,000 square feet. The standard deviation was 711.1 square feet.

When broken into the two groups of wealth, respondents (n=35) from the below average wealth school districts had a mean of 1,637 square feet, a median of 1,600 square feet, and a mode of 1,200 square feet. The below average wealth group had a standard deviation of 737.4 square feet. The respondents (n=35) from the above average wealth school district group had a mean of 1,487 square feet, a median of 1,500 square feet, and a mode of 1,000 square feet. The standard deviation for the above average wealth group was 686.1 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 1,870 square feet, the median was 1,632 square feet, and the mode was 1,200 square feet. The standard deviation was 910.6 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=17) revealed a mean of 1,594 square feet, a median of 1,600

square feet, and a mode of 2,000 square feet. The standard deviation was 454.9 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,270 square feet, the median was 1,050 square feet, and the mode was 1,000 square feet. The standard deviation was 460.3 square feet.

An analysis of the enrollment category of 999 or less (n=15) revealed a mean of 1,387 square feet, a median of 1,200 square feet, and a mode of 900 square feet. The standard deviation was 710.0 square feet.

Table 4-27

Number, Mean, Median, and Standard Deviation for
High School Choral Music Educational Space by Wealth
Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	35	1637	1600	737.4
Above Average	35	1487	1500	686.1
Enrollment				
10,000 or More	22	1870	1632	910.6
3,000 to 9,999	17	1594	1600	454.9
1,000 to 2,999	16	1270	1050	460.3
999 or less	15	1387	1200	710.0
Total Respondents	70	1562	1520	711.1

The comment analysis revealed that instructional concerns were primary factors in the participants' recommendations. These instructional concerns included space for activities such as lecture, group work, practice area, and singing area.

Other factors cited included the provision of adequate space for equipment, storage, and an office.

Instrumental Music

The responses (n=71) for the educational space of a high school instrumental music classroom ranged from a low of 350 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 6,000 square feet. An analysis of the responses yielded a mean of 2,417 square feet, a median of 2,250 square feet, and a mode of 2,000 square feet. The standard deviation was 1,122.4 square feet.

When broken into the two groups of wealth, respondents (n=36) from the below average wealth school districts had a mean of 2,441 square feet, a median of 2,125 square feet, and a mode of 2,000 square feet. The below average wealth group had a standard deviation of 1,203.8 square feet. The respondents (n=35) from the above average wealth school district group had a mean of 2,392 square feet, a median of 2,400 square feet, and a mode of 2,000 square feet. The standard deviation for the above average wealth group was 1,049.1 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 2,693 square feet, the median was 2,800 square feet, and the mode was 3,000 square feet. The standard deviation was 1,118.6 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=17) revealed a mean of 2,715 square feet, a median of 2,400 square feet, and a mode of 2,000 square feet. The standard deviation was 1,089.9 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,741 square feet, the median was 1,725 square feet, and the mode was 2,500 square feet. The standard deviation was 646.4 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 2,396 square feet, a median of 2,060 square feet, and a mode of 2,500 square feet. The standard deviation was 1,320.0 square feet.

Table 4-28

Number, Mean, Median, and Standard Deviation for High School Instrumental Music Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	2441	2125	1203.8
Above Average	35	2392	2400	1049.1
Enrollment				
10,000 or More	22	2693	2800	1118.6
3,000 to 9,999	17	2715	2400	1089.9
1,000 to 2,999	16	1741	1725	646.4
999 or less	16	2396	2060	1320.0
Total Respondents	71	2417	2250	1122.4

The comment analysis revealed that instructionally related activities were the primary concern in the participants' recommendations. The activities specified were lecture, group work, projects, and the arrangement of these activities.

Equipment was also cited as a factor. The arrangement and space needs concerned with chairs, music stands, and the instruments themselves were mentioned specifically. Also mentioned were the number of students to be served in this instructional setting, adequate storage space to accommodate the equipment, and an office area.

Vocational/Industrial/Business Education Spaces

Home Economics

The responses (n=70) for the educational space of a high school home economics laboratory ranged from a low of 300 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 4,532 square feet. An analysis of the responses yielded a mean of 1,656 square feet, a median of 1,450 square feet, and a mode of 1,200 square feet. The standard deviation was 806.1 square feet.

When broken into the two groups of wealth, respondents (n=36) from the below average wealth school districts had a mean of 1,712 square feet, a median of 1,400 square feet, and a mode of 1,200 square feet. The below average wealth group had a standard deviation of 859.5 square feet. The respondents (n=34) from the above average wealth school district group had a mean of 1,597 square feet, a median of 1,500 square feet, and a mode of 1,600 square feet. The standard deviation for the above average wealth group was 753.8 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 1,878 square feet, the median was 1,750 square feet, and the mode was 1,800 square feet. The standard deviation was 819.0 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=17) revealed a mean of 1,658 square feet, a median of 1,200 square feet, and a mode of 900 square feet. The standard deviation was 908.6 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,443 square feet, the median was 1,200 square feet, and the mode was 1,200 square feet. The standard deviation was 544.2 square feet.

An analysis of the enrollment category of 999 or less (n=15) revealed a mean of 1,556 square feet, a median of 1,400 square feet, and a mode of 1,600 square feet. The standard deviation was 892.4 square feet.

Table 4-29

Number, Mean, Median, and Standard Deviation for
Home Economics Educational Space by Wealth Groupings
Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	1712	1400	859.5
Above Average	34	1597	1500	753.8
Enrollment				
10,000 or More	22	1878	1750	819.0
3,000 to 9,999	17	1658	1200	908.6
1,000 to 2,999	16	1443	1200	544.2
999 or less	15	1556	1400	892.4
Total Respondents	70	1656	1450	806.1

Comment analysis of the factors cited by participants as being important in their recommendations for the square footage needed to provide an adequate education in home economics included equipment space, instruction space, safety concerns, and storage.

The primary concern was in the area of instruction. The concern for adequate space to carry out the variety of activities necessary in this subject, such as work station arrangement, demonstration areas, lecture area, and the variety of instructional arrangements were also cited.

Space to adequately provide for the safe use of equipment was also mentioned, as was the need for space for the different types of equipment. Also cited was the need for storage space.

General Agriculture Shop

The responses (n=65) for the educational space of a high school general agriculture shop ranged from a low of 400 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 6,000 square feet. An analysis of the responses yielded a mean of 2,279 square feet, a median of 2,000 square feet, and a mode of 2,000 square feet. The standard deviation was 1,107.2 square feet.

When broken into the two groups of wealth, respondents (n=34) from the below average wealth school districts had a mean of 2,358 square feet, a median of 2,000 square feet, and a mode of 2,000 square feet. The below average wealth group had a standard deviation of 1,090.5 square feet. The respondents (n=31) from the above average wealth school district group had a mean of 2,193 square feet, a median of 2,200 square feet, and a mode of 2,400 square feet. The standard deviation for the above average wealth group was 1,136.8 square feet.

When the responses (n=20) from the enrollment category of 10,000 or more were analyzed, the mean was 2,116 square feet, the median was 2,225 square feet, and the mode was 1,100 square feet. The standard deviation was 992.7 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=15) revealed a mean of 2,605 square feet, a median of 2,400

square feet, and a mode of 2,400 square feet. The standard deviation was 1,362.6 square feet.

When the responses (n=15) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 2,396 square feet, the median was 2,000 square feet, and the mode was 2,000 square feet. The standard deviation was 1,173.6 square feet.

An analysis of the enrollment category of 999 or less (n=15) revealed a mean of 2,055 square feet, a median of 2,000 square feet, and a mode of 2,000 square feet. The standard deviation was 901.0 square feet.

Table 4-30

Number, Mean, Median, and Standard Deviation for General Agriculture Shop Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	34	2358	2000	1090.5
Above Average	31	2193	2200	1136.8
Enrollment				
10,000 or More	20	2116	2225	992.7
3,000 to 9,999	15	2605	2400	1362.6
1,000 to 2,999	15	2396	2000	1173.6
999 or less	15	2055	2000	901.0
Total Respondents	65	2279	2000	1107.2

The comment analysis for general agriculture shop revealed that the factors guiding the participants' recommendations were centered around the need for adequate instructional space, equipment space, storage space, and safety.

In the area of instruction, the factors considered were the type of activities (lecture, demonstration, and work station), project space, and preparation space.

Space for the arrangement of equipment and its safe use was also cited as a factor considered in the recommendations.

Typing/Word Processing

The responses (n=70) for the educational space of a high school typing/word processing classroom ranged from a low of 300 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 3,000 square feet. An analysis of the responses yielded a mean of 1,148 square feet, a median of 1,000 square feet, and a mode of 1,000 square feet. The standard deviation was 416.6 square feet.

When broken into the two groups of wealth, respondents (n=36) from the below average wealth school districts had a mean of 1,078 square feet, a median of 1,000 square feet, and a mode of 1,000 square feet. The below average wealth group had a standard deviation of 291.6 square feet. The respondents (n=34) from the above average wealth school district group had a mean of 1,221 square feet, a median of 1,150 square feet, and a mode of 800 square feet. The standard deviation for the above average wealth group was 511.9 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 1,116 square feet, the median was 1,000 square feet, and the mode was 1,000 square feet. The standard deviation was 392.8 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=17) revealed a mean of 1,100 square feet, a median of 1,000 square feet, and a mode of 800 square feet. The standard deviation was 312.7 square feet.

When the responses (n=16) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 1,140 square feet, the median was 1,100 square feet, and the mode was 1,000 square feet. The standard deviation was 296.4 square feet.

An analysis of the enrollment category of 999 or less (n=15) revealed a mean of 1,258 square feet, a median of 1,100 square feet, and a mode of 900 square feet. The standard deviation was 633.1 square feet.

Table 4-31

Number, Mean, Median, and Standard Deviation for Typing/Word Processing Educational Space by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	36	1078	1000	291.5
Above Average	34	1221	1150	511.9
Enrollment				
10,000 or More	22	1116	1000	392.8
3,000 to 9,999	17	1100	1000	312.7
1,000 to 2,999	16	1140	1100	296.4
999 or less	15	1258	1100	633.1
Total Respondents	70	1148	1000	416.6

A comment analysis of the factors considered by practitioners in making their recommendations, for the space needed to provide an adequate education in the area of typing and word processing, were primarily concerned with equipment. The arrangement of the equipment and the space needed to accommodate the equipment necessary to provide instruction in this area were the major concerns. Also mentioned were the instructional aspects of the curriculum and the activities required.

Special Education Educational Spaces

The content analysis for the categories of special education selected for this study were combined because of the relatedness of the factors mentioned by the participants as being considered when making their recommendations. The primary factors cited were equipment, flexibility, instructional, furniture related, student related, and storage.

The instructionally related components of space needed for an adequate education centered around the types of activities and the necessary space to conduct them. These activities included learning centers, exercise areas, free space, group activities, independent study areas, lecture area, preparation area, privacy needs, special seating arrangements, the variety of subject areas taught, and student work spaces.

The factors mentioned in the equipment area included wheel chair space, large equipment space, and the space necessary for special equipment needed to meet the needs of special students. Furniture aspects included space for desks, chairs, and special furniture.

Student factors considered included the number of students being served and the type of student in consideration. Flexibility was cited as a factor because of the ability to use special education areas as a regular classroom.

Educable Mentally Retarded

The responses (n=70) for the educational space of a classroom for the educably mentally retarded ranged from a low of 250 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 1,800 square feet. An analysis of the responses yielded a mean of 820 square feet, a median of 750 square feet, and a mode of 600 square feet. The standard deviation was 307.5 square feet.

When broken into the two groups of wealth, respondents (n=33) from the below average wealth school districts had a mean of 806 square feet, a median of 700 square feet, and a mode of 600 square feet. The below average wealth group had a standard deviation of 296.8 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 832 square feet, a median of 750 square feet, and a mode of 750 square feet. The standard deviation for the above average wealth group was 320.4 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 857 square feet, the median was 750 square feet, and the mode was 750 square feet. The standard deviation was 295.6 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 794 square feet, a median of 750 square feet, and a mode of 600 square feet. The standard deviation was 195.6 square feet.

When the responses (n=14) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 792 square feet, the median was 663 square feet, and the mode was 600 square feet. The standard deviation was 345.5 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 821 square feet, a median of 700 square feet, and a mode of 500 square feet. The standard deviation was 402.9 square feet.

Table 4-32

Number, Mean, Median, and Standard Deviation for Educational Space for Educable Mentally Retarded by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	33	806	700	296.8
Above Average	37	832	750	320.4
Enrollment				
10,000 or More	22	857	750	295.6
3,000 to 9,999	18	794	750	195.6
1,000 to 2,999	14	792	663	345.5
999 or less	16	821	700	402.9
Total Respondents	70	820	750	307.5

Trainable Mentally Retarded

The responses (n=71) for the educational space of a classroom for the trainable mentally retarded ranged from a low of 300 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 1,800 square feet. An analysis of the responses yielded a mean of 863 square feet, a median of 750 square feet, and a mode of 750 square feet. The standard deviation was 342.6 square feet.

When broken into the two groups of wealth, respondents (n=34) from the below average wealth school districts had a mean of 858 square feet, a median of 720 square feet, and a mode of 600 square feet. The below average wealth group had a standard deviation of 357.0 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 868 square feet, a median of 750 square feet, and a mode of 750 square feet. The standard deviation for the above average wealth group was 333.6 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 908 square feet, the median was 784 square feet, and the mode was 800 square feet. The standard deviation was 322.0 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 879 square feet, a median of 750 square feet, and a mode of 750 square feet. The standard deviation was 298.3 square feet.

When the responses (n=15) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 812 square feet, the median was 675 square feet, and the mode was 600 square feet. The standard deviation was 386.3 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 834 square feet, a median of 725 square feet, and a mode of 500 square feet. The standard deviation was 394.4 square feet.

Table 4-33

Number, Mean, Median, and Standard Deviation for
Educational Space for Trainable Mentally Retarded by
Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	34	858	720	357.0
Above Average	37	868	750	333.6
Enrollment				
10,000 or More	22	908	784	322.0
3,000 to 9,999	18	879	750	298.3
1,000 to 2,999	15	812	675	386.3
999 or less	16	834	725	394.4
Total Respondents	71	863	750	342.6

Severe & Profound

The responses (n=71) for the educational space of a classroom for the severely and profoundly mentally retarded ranged from a low of 350 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 3,000 square feet. An analysis of the responses yielded a mean of 960 square feet, a median of 768 square feet, and a mode of 500 square feet. The standard deviation was 514.8 square feet.

When broken into the two groups of wealth, respondents (n=34) from the below average wealth school districts had a mean of 1,028 square feet, a median of 784 square feet, and a mode of 500 square feet. The below average wealth group had a standard deviation of 621.8 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 898 square feet, a median of 750 square feet, and a mode of 800 square feet. The

standard deviation for the above average wealth group was 390.7 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 1,058 square feet, the median was 800 square feet, and the mode was 800 square feet. The standard deviation was 587.3 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 1,041 square feet, a median of 850 square feet, and a mode of 900 square feet. The standard deviation was 615.0 square feet.

When the responses (n=15) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 818 square feet, the median was 728 square feet, and the mode was 600 square feet. The standard deviation was 350.6 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 868 square feet, a median of 750 square feet, and a mode of 500 square feet. The standard deviation was 399.6 square feet.

Table 4-34

Number, Mean, Median, and Standard Deviation for Educational Space for Severely and Profoundly Retarded by Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	34	1028	784	621.8
Above Average	37	898	750	390.7
Enrollment				
10,000 or More	22	1058	800	587.3
3,000 to 9,999	18	1041	850	615.0
1,000 to 2,999	15	818	728	350.6
999 or less	16	868	750	399.6
Total Respondents	71	960	768	514.8

Physically Handicapped

The responses (n=69) for the educational space of a classroom for the physically handicapped ranged from a low of 350 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 2,000 square feet. An analysis of the responses yielded a mean of 932 square feet, a median of 800 square feet, and a mode of 750 square feet. The standard deviation was 382.4 square feet.

When broken into the two groups of wealth, respondents (n=33) from the below average wealth school districts had a mean of 976 square feet, a median of 850 square feet, and a mode of 600 square feet. The below average wealth group had a standard deviation of 410.3 square feet. The respondents (n=36) from the above average wealth school district group had a mean of 891 square feet, a median of 775 square feet, and a mode of 750 square feet. The

standard deviation for the above average wealth group was 355.9 square feet.

When the responses (n=21) from the enrollment category of 10,000 or more were analyzed, the mean was 990 square feet, the median was 800 square feet, and the mode was 800 square feet. The standard deviation was 400.9 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 1,000 square feet, a median of 900 square feet, and a mode of 900 square feet. The standard deviation was 401.8 square feet.

When the responses (n=14) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 824 square feet, the median was 750 square feet, and the mode was 600 square feet. The standard deviation was 331.3 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 873 square feet, a median of 775 square feet, and a mode of 650 square feet. The standard deviation was 381.8 square feet.

Table 4-35

Number, Mean, Median, and Standard Deviation for
Educational Space for Physically Handicapped by
Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	33	976	850	410.3
Above Average	36	891	775	355.9
Enrollment				
10,000 or More	21	990	800	400.9
3,000 to 9,999	18	1000	900	401.8
1,000 to 2,999	14	824	750	331.3
999 or less	16	873	775	381.8
Total Respondents	69	932	800	382.4

Emotionally Disturbed

The responses (n=70) for the educational space of a classroom for the emotionally disturbed ranged from a low of 250 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 2,000 square feet. An analysis of the responses yielded a mean of 858 square feet, a median of 750 square feet, and a mode of 750 square feet. The standard deviation was 333.1 square feet.

When broken into the two groups of wealth, respondents (n=33) from the below average wealth school districts had a mean of 885 square feet, a median of 800 square feet, and a mode of 600 square feet. The below average wealth group had a standard deviation of 351.1 square feet. The respondents (n=37) from the above average wealth school district group had a mean of 834 square feet, a median of 750 square feet, and a mode of 750 square feet. The

standard deviation for the above average wealth group was 319.0 square feet.

When the responses (n=22) from the enrollment category of 10,000 or more were analyzed, the mean was 945 square feet, the median was 800 square feet, and the mode was 750 square feet. The standard deviation was 348.8 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 851 square feet, a median of 790 square feet, and a mode of 750 square feet. The standard deviation was 311.8 square feet.

When the responses (n=14) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 760 square feet, the median was 730 square feet, and the mode was 750 square feet. The standard deviation was 263.5 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 833 square feet, a median of 750 square feet, and a mode of 600 square feet. The standard deviation was 385.8 square feet.

Table 4-36

Number, Mean, Median, and Standard Deviation for
Educational Space for Emotionally Disturbed by
Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	33	885	800	351.1
Above Average	37	834	750	319.0
Enrollment				
10,000 or More	22	945	800	348.8
3,000 to 9,999	18	851	790	311.8
1,000 to 2,999	14	760	730	263.5
999 or less	16	833	750	385.8
Total Respondents	70	858	750	333.1

Gifted & Talented

The responses (n=69) for the educational space of a classroom for the gifted and talented ranged from a low of 250 square feet (response from a kindergarten to grade eight district with 16 children) to a high of 1,800 square feet. An analysis of the responses yielded a mean of 754 square feet, a median of 732 square feet, and a mode of 600 square feet. The standard deviation was 261.6 square feet.

When broken into the two groups of wealth, respondents (n=33) from the below average wealth school districts had a mean of 763 square feet, a median of 720 square feet, and a mode of 600 square feet. The below average wealth group had a standard deviation of 270.0 square feet. The respondents (n=36) from the above average wealth school district group had a mean of 746 square feet, a median of 741 square feet, and a mode of 750 square feet. The standard deviation for the above average wealth group was 257.3 square feet.

When the responses (n=20) from the enrollment category of 10,000 or more were analyzed, the mean was 693 square feet, the median was 710 square feet, and the mode was 600 square feet. The standard deviation was 163.4 square feet.

An analysis of the enrollment category of 3,000 to 9,999 (n=18) revealed a mean of 781 square feet, a median of 765 square feet, and a mode of 900 square feet. The standard deviation was 156.7 square feet.

When the responses (n=15) from the enrollment category of 1,000 to 2,999 were analyzed, the mean was 772 square feet, the median was 728 square feet, and the mode was 600 square feet. The standard deviation was 291.1 square feet.

An analysis of the enrollment category of 999 or less (n=16) revealed a mean of 784 square feet, a median of 700 square feet, and a mode of 600 square feet. The standard deviation was 403.1 square feet.

Table 4-37

Number, Mean, Median, and Standard Deviation for
Educational Space for Gifted and Talented by
Wealth Groupings, Enrollment Groupings, and Total Responses

Category	Number	Mean	Median	S.D.
Wealth				
Below Average	33	763	720	270.0
Above Average	36	746	741	257.3
Enrollment				
10,000 or More	20	693	710	163.4
3,000 to 9,999	18	781	765	156.7
1,000 to 2,999	15	772	728	291.1
999 or less	16	784	700	403.1
Total Respondents	69	754	732	261.6

Research Question One

A one-way analysis of variance (ANOVA) procedure was used to determine if there were any differences between the perceptions of superintendents from below average wealth school districts and above average wealth school districts pertaining to the square footage necessary to provide an adequate education in selected educational spaces. The selected educational spaces were:

- A. General Classrooms
  - 1. Elementary
  - 2. Middle School and Junior High
  - 3. High School
- B. Laboratories
  - 1. Science
  - 2. Arts/Crafts
  - 3. Music
- C. Shops for Vocational/Industrial Arts and Business
- D. Special Education

The analyses were conducted in the following order:

Elementary Spaces

1. Prekindergarten by wealth group
2. Kindergarten by wealth group
3. Grades one through four by wealth group
4. Grades five and six by wealth group
5. Elementary art by wealth group
6. Elementary music by wealth group

Junior High/Middle School Spaces

7. General classroom by wealth group
8. Science by wealth group
9. Art by wealth group
10. Choral music by wealth group
11. Instrumental music by wealth group
12. Homemaking laboratory by wealth group

High School Spaces

13. General classroom by wealth group
14. Physical science by wealth group
15. Biology by wealth group
16. Chemistry by wealth group
17. Physics by wealth group
18. Art by wealth group
19. Choral music by wealth group
20. Instrumental music by wealth group

Vocational/Industrial/Business Education Spaces

21. Home economics by wealth group
22. General agriculture shop by wealth group
23. Typing/Word processing by wealth group

Special Education Spaces

24. Educable mentally retarded by wealth group
25. Trainable mentally retarded by wealth group
26. Severe and profound by wealth group

27. Physically handicapped by wealth group
28. Emotionally disturbed by wealth group
29. Gifted and talented by wealth group

The number of responses varied for each category of space. The level of significance used for these analyses was 0.05. Each category of educational space is analyzed and reported separately within its respective group.

Categorical Description by Group

Elementary Educational Spaces

The elementary education group was composed of six categories. These categories were prekindergarten, kindergarten, grades 1-4, grades 5-6, art, and music.

An analysis of responses by wealth category for the square footages perceived by superintendents to be necessary to provide an adequate education for prekindergarten was performed by using the ANOVA technique and is reported in Table 4-38. The results of this procedure showed that there was no significant difference between the perceptions of superintendents from districts of below state average wealth and those from above state average wealth (N=71,M=885,F=0.8530).

An ANOVA was also performed between the two wealth groups of above and below state average and the educational spaces of kindergarten (N=73,M=888,F=0.8360), grades 1-4

(N=73,M=797,F=0.6413), grades 5-6 (N=73,M=799,F=0.7491), art (N=69,M=1010,F=0.7105), and music (N=71,M=1068,F=0.3077) and are also reported in Table 4-38.

Table 4-38

Between Wealth Categories description of
Total Respondents, Mean Square Footage, and
F Probability for Elementary Educational Spaces

Space	N	Mean	F
Prekindergarten	71	885	0.8530
Kindergarten	73	888	0.8360
Grades 1-4	73	797	0.6413
Grades 5-6	73	799	0.7491
Art	69	1010	0.7105
Music	71	1068	0.3077

None of the elementary educational space analyses suggested that there were significant differences between the perceptions of superintendents from below and above state average wealth districts.

Junior High/Middle School Educational Spaces

The junior high/middle school group was comprised of six categories of educational space. These categories were general classroom, science, art, choral music, instrumental music, and homemaking laboratory.

An analysis of these responses by wealth category, for the square footages perceived by superintendents to be necessary to provide an adequate education, was performed by using the ANOVA technique and is reported in Table 4-39.

The results of the ANOVA performed between the two wealth groups of above and below state average and the perceived square footage needs of these educational spaces showed: general classrooms (N=72,M=793,F=0.6831), science (N=73,M=1102,F=0.4581), art (N=72,M=1099,F=0.2796), choral music (N=71,M=1154,F=0.8855), instrumental music (N=73,M=1642,F=0.6988), and homemaking laboratory (N=64,M=1398,F=0.2091).

Table 4-39

Between Wealth Categories Description of Total Respondents, Mean Square Footage, and F Probability Between for Junior High/Middle School Educational Spaces

Space	N	Mean	F
General Classrooms	72	793	0.6831
Science	73	1102	0.4581
Art	72	1099	0.2796
Choral Music	71	1154	0.8855
Instrumental Music	73	1642	0.6988
Homemaking Laboratory	64	1398	0.2091

None of the middle school/junior high educational space analyses suggested that there were significant differences between the perceptions of superintendents from below and above state average wealth districts.

High School Educational Spaces

The high school group was comprised of eight categories of educational space. These categories were general classroom, physical science, biology, chemistry, physics, art, choral music, and instrumental music.

An analysis of these responses by wealth category, for the square footages perceived by superintendents to be necessary to provide an adequate education, was performed by using the ANOVA technique and is reported in Table 4-40.

The results of the ANOVA performed between the two wealth groups of above and below state average and the perceived square footage needs of these educational spaces showed: general classrooms (N=71,M=804,F=0.7738), physical science (N=72,M=1178,F=0.7690), biology (N=71,M=1205,F=0.4487), chemistry (N=71,M=1243,F=0.9381), physics (N=70,M=1217,F=0.8942), art (N=72,M=1243,F=0.6983) choral music (N=70,M=1562,F=0.3803), and instrumental music (N=71,M=2417,F=0.8559).

Table 4-40

Between Wealth Categories Description of
Total Respondents, Mean Square Footage, and
F Probability for High School Educational Spaces

Space	N	Mean	F
General Classrooms	71	804	0.7738
Physical Science	72	1178	0.7690
Biology	71	1205	0.4487
Chemistry	71	1243	0.9381
Physics	70	1217	0.8942
Art	72	1243	0.6983
Choral Music	70	1562	0.3803
Instrumental Music	71	2417	0.8559

None of the high school educational space analyses suggested that there were significant differences between the perceptions of superintendents from below and above state average wealth districts.

Vocational/Industrial/Business Educational Spaces

The vocational/industrial/business education group was comprised of three categories of educational space. These categories were home economics, general agriculture shop, and typing/word processing.

An analysis of these responses by wealth category, for the square footages perceived by superintendents to be necessary to provide an adequate education, was performed by using the ANOVA technique and is reported in Table 4-41.

The results of the ANOVA performed between the two wealth groups of above and below state average and the perceived square footage needs of these educational spaces showed: home economics (N=70,M=1656,F=0.5562), general agriculture shop (N=65,M=2279,F=0.5521), and typing/word processing (N=70,M=1148,F=0.1530).

Table 4-41

Between Wealth Categories Description of
Total Respondents, Mean Square Footage, and
F Probability for Vocational/Industrial/Business Educational Spaces

Space	N	Mean	F
Home Economics	70	1656	0.5562
General Agriculture Lab	65	2279	0.5521
Typing/Word Processing	70	1148	0.1530

None of the vocational/industrial/business educational space analyses suggested that there were significant differences between the perceptions of superintendents from below and above state average wealth districts.

Special Education Educational Spaces

The special education group was comprised of six categories of educational space. These categories were educable mentally retarded, trainable mentally retarded, severe and profoundly retarded, physically handicapped, emotionally disturbed, and gifted and talented.

An analysis of these responses by wealth category, for the square footages perceived by superintendents to be necessary to provide an adequate education, was performed by using the ANOVA technique and is reported in Table 4-42.

The results of the ANOVA performed between the two wealth groups of above and below state average and the perceived square footage needs of these educational spaces showed: educable mentally retarded (N-70,M-820,F-0.7302), trainable mentally retarded (N-71,M-863,F-0.9020), severe and profoundly retarded (N-71,M-960,F-0.2915), physically handicapped (N-69,M-932,F-0.3575), emotionally disturbed (N-70,M-858,F-0.5258), and gifted and talented (N-69,M-754,F-0.7877).

Table 4-42

Between Wealth Categories Description of
Total Respondents, Mean Square Footage, and
F Probability for Special Education Spaces

Space	N	Mean	F
Educable Mentally Retarded	70	820	0.7302
Trainable Mentally Retarded	71	863	0.9020
Severe and Profound	71	960	0.2915
Physically Handicapped	69	932	0.3575
Emotionally Disturbed	70	858	0.5258
Gifted and Talented	69	754	0.7877

None of the special education space analyses suggested that there were significant differences between the perceptions of superintendents from below and above state average wealth districts.

Summary

The ANOVA tests performed suggested there were no significant differences between the perceptions of superintendents of school districts from below average state wealth and those from above average state wealth pertaining to the described categories of educational space.

Research Question Two

This research question explored the differences between the perceptions of superintendents from school districts of varying enrollments. The four groups of student enrollment used in this study were: Group 1 of 10,000 or more; Group 2 of 3,000 to 9,999; Group 3 of 1,000 to 2,999; and Group 4 of 999 or less.

The number of responses varied for each category of space. The level of significance used for these analyses was 0.01. Each category of educational space is analyzed and reported separately.

The Mann-Whitney U technique was used to discover significant differences between the perceptions of superintendents from the four enrollment groups. This test was selected because of the limited degree of the homogeneity of variance between the enrollment groups.

The analyses was performed in pairs of groups of enrollment for selected educational spaces. Analyses of these educational spaces were conducted by enrollment group pairs of one and two, one and three, one and four, two and three, two and four, and three and four in the following order:

Elementary Spaces

1. Prekindergarten
2. Kindergarten
3. Grades one through four
4. Grades five and six

5. Elementary art
6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded

25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

Categorical Description by Group

Elementary Educational Spaces

The elementary education group was composed of six categories. These categories were prekindergarten, kindergarten, grades 1-4, grades 5-6, art, and music.

An analysis of responses by enrollment group pair for the square footages perceived by superintendents to be necessary to provide an adequate education in the elementary area was performed by using the Mann-Whitney U test and is reported in Tables 4-43 through 4-48.

Table 4-43

Mann-Whitney U Significance Test
Between Enrollment Groups in
Prekindergarten Educational Space

Enrollment Groups	2-tailed P
1 by 2	0.4181
1 by 3	0.6104
1 by 4	0.1819
2 by 3	0.9861
2 by 4	0.5483
3 by 4	0.3283

Table 4-44

Mann-Whitney U Significance Test
Between Enrollment Groups in
Kindergarten Educational Space

Enrollment Groups	2-tailed P
1 by 2	0.5078
1 by 3	0.4440
1 by 4	0.1256
2 by 3	0.9861
2 by 4	0.3400
3 by 4	0.3618

Table 4-45

Mann-Whitney U Significance Test
Between Enrollment Groups in
Grades 1-4 Educational Spaces

Enrollment Groups	2-tailed P
1 by 2	0.0060
1 by 3	0.0441
1 by 4	0.0115
2 by 3	0.8077
2 by 4	0.4246
3 by 4	0.4381

Table 4-46

Mann-Whitney U Significance Test
Between Enrollment Groups in
Grades 5-6 Educational Spaces

Enrollment Groups	2-tailed P
1 by 2	0.2044
1 by 3	0.8181
1 by 4	0.0161
2 by 3	0.5088
2 by 4	0.1663
3 by 4	0.0668

Table 4-47

Mann-Whitney U Significance Test
Between Enrollment Groups in
Elementary Art Education Space

Enrollment Groups	2-tailed P
1 by 2	0.8893
1 by 3	0.6985
1 by 4	0.3219
2 by 3	0.9089
2 by 4	0.4218
3 by 4	0.4004

Table 4-48

Mann-Whitney U Significance Test
Between Enrollment Groups in
Elementary Music Education Space

Enrollment Groups	2-tailed P
1 by 2	0.1882
1 by 3	0.7768
1 by 4	0.1673
2 by 3	0.2175
2 by 4	0.5006
3 by 4	0.1485

The results of these procedures showed that there were no significant differences between the perceptions of superintendents from districts of varying enrollment pertaining to square footage needs for an adequate education in the elementary area, except between groups one and two in the grades 1-4 educational space.

Junior High/Middle School Educational Spaces

The junior high/middle school education group was composed of six categories. These categories were general classroom, science, art, choral music, instrumental music, and homemaking laboratory.

An analysis of responses by enrollment group pair for the square footages perceived by superintendents to be necessary to provide an adequate education for the middle school/junior high area was performed by using the Mann-Whitney U test and is reported in Tables 4-49 through 4-54.

Table 4-49

Mann-Whitney U Significance Test
Between Enrollment Groups in Junior High/Middle School
General Classroom Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.7110
1 by 3	0.6437
1 by 4	0.0768
2 by 3	0.8337
2 by 4	0.0615
3 by 4	0.0672

Table 4-50

Mann-Whitney U Significance Test Between Enrollment Groups in Junior High/Middle School Science Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.2427
1 by 3	0.8403
1 by 4	0.4535
2 by 3	0.2318
2 by 4	0.7548
3 by 4	0.5197

Table 4-51

Mann-Whitney U Significance Test Between Enrollment Groups in Junior High/Middle School Art Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.3768
1 by 3	0.0952
1 by 4	0.3508
2 by 3	0.5441
2 by 4	0.8620
3 by 4	0.9044

Table 4-52

Mann-Whitney U Significance Test
Between Enrollment Groups in Junior High/Middle School
Choral Music Education Space

Enrollment Groups	2-tailed P
1 by 2	0.6928
1 by 3	0.2231
1 by 4	0.3085
2 by 3	0.1060
2 by 4	0.1913
3 by 4	0.9334

Table 4-53

Mann-Whitney U Significance Test
Between Enrollment Groups in Junior High/Middle School
Instrumental Music Education Space

Enrollment Groups	2-tailed P
1 by 2	0.5194
1 by 3	0.7858
1 by 4	0.9089
2 by 3	0.4468
2 by 4	0.4679
3 by 4	0.8203

Table 4-54

Mann-Whitney U Significance Test
Between Enrollment Groups in Junior High/Middle School
Homemaking Laboratory Education Space

Enrollment Groups	2-tailed P
1 by 2	0.5089
1 by 3	0.0750
1 by 4	0.1766
2 by 3	0.2424
2 by 4	0.8026
3 by 4	0.3677

The results of this procedure showed that there was no significant difference between the perceptions of superintendents from districts of varying enrollment pertaining to square footage needs for an adequate education in the middle school/junior high area.

High School Educational Spaces

The high school education group was composed of eight categories. These categories were general classroom, physical science, biology, chemistry, physics, art, choral music, and instrumental music.

An analysis of responses by enrollment group pair for the square footages perceived by superintendents to be necessary to provide an adequate education for the high school area was performed by using the Mann-Whitney U test and is reported in Tables 4-55 through 4-62.

Table 4-55

Mann-Whitney U Significance Test
Between Enrollment Groups in High School
General Classroom Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.4839
1 by 3	0.1008
1 by 4	0.0957
2 by 3	0.0532
2 by 4	0.2590
3 by 4	0.0164

Table 4-56

Mann-Whitney U Significance Test
Between Enrollment Groups in
Physical Science Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.4264
1 by 3	0.2499
1 by 4	0.7781
2 by 3	0.7163
2 by 4	0.7316
3 by 4	0.4590

Table 4-57

Mann-Whitney U Significance Test
Between Enrollment Groups in
Biology Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.8091
1 by 3	0.1825
1 by 4	0.8706
2 by 3	0.2944
2 by 4	0.9136
3 by 4	0.3549

Table 4-58

Mann-Whitney U Significance Test
Between Enrollment Groups in
Chemistry Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.6091
1 by 3	0.0914
1 by 4	0.5838
2 by 3	0.1482
2 by 4	0.7860
3 by 4	0.2269

Table 4-59

Mann-Whitney U Significance Test
Between Enrollment Groups in
Physics Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.5662
1 by 3	0.2129
1 by 4	0.8779
2 by 3	0.3289
2 by 4	0.6641
3 by 4	0.2193

Table 4-60

Mann-Whitney U Significance Test
Between Enrollment Groups in High School
Art Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.8748
1 by 3	0.0125
1 by 4	0.3199
2 by 3	0.0088
2 by 4	0.2842
3 by 4	0.4922

Table 4-61

Mann-Whitney U Significance Test
Between Enrollment Groups in High School
Choral Music Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.4780
1 by 3	0.0253
1 by 4	0.0972
2 by 3	0.0760
2 by 4	0.2620
3 by 4	0.7211

Table 4-62

Mann-Whitney U Significance Test
Between Enrollment Groups in High School
Instrumental Music Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.9660
1 by 3	0.0043
1 by 4	0.2799
2 by 3	0.0056
2 by 4	0.2127
3 by 4	0.2049

The results of this procedure showed that there was no significant difference between the perceptions of superintendents from districts of varying enrollment pertaining to square footage needs for an adequate education in the high school spaces of general classroom, physical science, biology, chemistry, physics, or choral music. However, there were significant differences between enrollment groups two and three in the area of art; groups one and three in the area of instrumental music; and groups two and three in the area of instrumental music.

Vocational/Industrial/Business Educational Spaces

The Vocational/Industrial/Business education group was composed of three categories. These categories were home economics, general vocational agriculture shop, and typing/word processing.

An analysis of responses by enrollment group pair for the square footages perceived by superintendents to be necessary to provide an adequate education for the vocational/industrial/business areas was performed by using the Mann-Whitney U test and is reported in Tables 4-63 through 4-65.

Table 4-63

Mann-Whitney U Significance Test
Between Enrollment Groups in
Home Economics Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.2331
1 by 3	0.0409
1 by 4	0.0744
2 by 3	0.9710
2 by 4	0.9244
3 by 4	0.7502

Table 4-64

Mann-Whitney U Significance Test
Between Enrollment Groups in
General Agriculture Shop Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.3944
1 by 3	0.5152
1 by 4	0.9600
2 by 3	0.6474
2 by 4	0.2879
3 by 4	0.5879

Table 4-65

Mann-Whitney U Significance Test
Between Enrollment Groups in
Typing/Word Processing Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.9433
1 by 3	0.4308
1 by 4	0.4381
2 by 3	0.6640
2 by 4	0.4716
3 by 4	0.7630

The results of this procedure showed that there was no significant difference between the perceptions of superintendents from districts of varying enrollment pertaining to square footage needs for an adequate education in the vocational/industrial/business educational areas.

Special Education Educational Spaces

The Special Education group was composed of six categories. These categories were educable mentally retarded, trainable mentally retarded, severe and profoundly retarded, physically handicapped, emotionally disturbed, and gifted and talented.

An analysis of responses by enrollment group pair for the square footages perceived by superintendents to be necessary to provide an adequate education for the special education areas was performed by using the Mann-Whitney U test and is reported in Tables 4-66 through 4-71.

Table 4-66

Mann-Whitney U Significance Test
Between Enrollment Groups in
Educable Mentally Retarded Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.6823
1 by 3	0.1262
1 by 4	0.4150
2 by 3	0.2292
2 by 4	0.5915
3 by 4	0.6312

Table 4-67

Mann-Whitney U Significance Test Between Enrollment Groups in Trainable Mentally Retarded Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.8915
1 by 3	0.1071
1 by 4	0.3504
2 by 3	0.0720
2 by 4	0.3775
3 by 4	0.5258

Table 4-68

Mann-Whitney U Significance Test Between Enrollment Groups in Severe and Profound Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.7333
1 by 3	0.0528
1 by 4	0.3066
2 by 3	0.1795
2 by 4	0.4997
3 by 4	0.6773

Table 4-69

Mann-Whitney U Significance Test
Between Enrollment Groups in
Physically Handicapped Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.9662
1 by 3	0.1200
1 by 4	0.2956
2 by 3	0.1086
2 by 4	0.3238
3 by 4	0.6019

Table 4-70

Mann-Whitney U Significance Test
Between Enrollment Groups in
Emotionally Disturbed Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.7023
1 by 3	0.0418
1 by 4	0.2663
2 by 3	0.0634
2 by 4	0.5213
3 by 4	0.5593

Table 4-71

Mann-Whitney U Significance Test
Between Enrollment Groups in
Gifted and Talented Education Spaces

Enrollment Groups	2-tailed P
1 by 2	0.1161
1 by 3	0.8534
1 by 4	0.6544
2 by 3	0.1896
2 by 4	0.3769
3 by 4	0.8582

The results of this procedure showed that there was no significant difference between the perceptions of superintendents from districts of varying enrollment pertaining to square footage needs for an adequate education in the special education area.

Summary

The results of the Mann-Whitney U test suggest that there is reason to suspect that there are differences in the perceptions of superintendents from varying enrollment groupings regarding the square footage necessary to provide an adequate education in some areas.

Perceptions of superintendents from enrollment group one (10,000 or more) appear to differ significantly from their counterparts in enrollment group two (3,000 to 9,999) about the space necessary for an adequate education in the classrooms of the first through fourth grades (Table 4-45).

Another area that the Mann-Whitney U test revealed was significant was the perceptions between enrollment groups two (3,000 to 9,999) and three (1,000 to 2,999) pertaining the square footage needs of high school art (Table 4-60). In addition, in the area of high school instrumental music, there were significant differences in participant perceptions between enrollment group three (1,000 to 2,999) and enrollment groups one (10,000 or more) and two (3,000 to 9,999) about the space necessary for an adequate education (Table 4-62).

Research Question Three

The third research question explored the differences between the perceptions of superintendents in Texas school districts and the literature concerning the square footage necessary for an adequate education in the selected spaces of:

Elementary Spaces

1. Prekindergarten
2. Kindergarten
3. Grades one through four
4. Grades five and six
5. Elementary art
6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry

17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

The literature prescribed a multitude of recommendations for adequate square footage in the specific educational settings described above. In addition, the literature recommendations were derived from the standards and recommendations set forth by other states as well as recommendations of experts secured through personal contact (Tables 4-72, 4-73, 4-74, 4-75, and 4-76). The determination of the identity of the experts used was through peer recommendations.

Table 4-72

Literature Review of Square Foot
Standards/Recommendations for
Elementary Classroom Space

State	PRE-KINDERGARTEN	KINDERGARTEN	1-6	ART	MUSIC
DELAWARE		1150	840	840	500
FLORIDA	960	960	960		
GEORGIA		750	705	1000	900
ILLINOIS	1100	1100	900		
INDIANA		1100	900	1000	1000
KENTUCKY		720	720	720	720
MAINE		1000	800	1200	800
MARYLAND					
MICHIGAN		1500	900	1200	1000
N. CAROLINA		1200	1025	1200	925
OKLAHOMA		950	800	950	950
PENNSYLVANIA					1175
S. CAROLINA		1075	720		
TENNESSEE		900	800	900	
VERMONT					
VIRGINIA		975	780		
STATE AVG.	1030	1029	835	1001	886
GRAVES		950	800	950	950
CASTALDI		1100	875		
CANDOLI	1000	1000	900	1000	1000
HERMAN	1100	1100	875	1100	950
GLASS	1500	1500	1200	1500	1500
VICK	800	800	700	900	900
TOTAL AVG.	1086	1068	883	1075	1031

Table 4-73

Literature Review of Square Foot
Standards/Recommendations for
Middle School/Junior High Classroom Space

	6-9	SCIENCE	ART	CHORAL MUSIC	INSTRUMENTAL MUSIC	HOME MAKING
DELAWARE	700		1950	950	1150	
FLORIDA	900					
GEORGIA	630	1050	1900	1300	1500	
ILLINOIS	900					
INDIANA	900	1200	1200	1200	1200	
KENTUCKY	625	1625	1200	900	2500	
MAINE		625		1200	1300	1300
MARYLAND						
MICHIGAN	900	1300	1820	1400		
N. CAROLINA	800	1100	1200	1100	1100	
OKLAHOMA	800	950	1150	950	1050	1425
PENNSYLVANIA				1175	1175	
S. CAROLINA	720					
TENNESSEE	660		900			1650
VERMONT						
VIRGINIA	682.5					1600
STATE AVG.	757	1204	1391	1142	1372	1558
GRAVES	800	950	1150	950	1050	1425
CASTALDI			1250	1300	1400	1300
CANDOLI	800	1200	1100	1200	2000	1250
HERMAN	800	1000	1000	1000	1400	1400
GLASS	900	1500	1500	1500	1500	1800
VICK	700	1250	1100	900	900	1000
TOTAL AVG.	792	1184	1213	1141	1374	1390

Table 4-74

Literature Review of Square Foot
Standards/Recommendations for
High School Classroom Space

	9-12	PHYSICAL SCIENCE	BIOLOGY	CHEMISTRY	PHYSICS	ART	CHORAL MUSIC	INSTRUMENTAL MUSIC
DELAWARE	700					1567	950	1150
FLORIDA	810	1225	1225	1225	1225			
GEORGIA	600	1100	1100	1100	1100	1900	1650	2100
ILLINOIS	750	1000				1000		
INDIANA	800	1200	1200	1200	1200	1200	1200	1200
KENTUCKY	625	1625	1625	1625	1625	1200	900	2500
MAINE	625	1200	1200	1200	1200	1200	1600	1600
MARYLAND								
MICHIGAN	900	1720	1720	1720	1720	1800		3000
N. CAROLINA	1500	1200	1200	1500	1200	1350	1100	1700
OKLAHOMA	725	1358	920	1358	1358	1450	1240	1620
PENNSYLVANIA							1175	1175
S. CAROLINA	720							
TENNESSEE	660					1200		
VERMONT								
VIRGINIA	630							
STATE AVG.	773	1292	1274	1366	1329	1386	1227	1783
GRAVES	725	920	1358	1358	1358	1450	1240	1620
CASTALDI		1000	1000	1050	1000		1300	1400
CANDOLI	800	1200	1200	1200	1200	1260	1200	3000
HERMAN	750	1250	1250	1250	1100	1500	1300	1400
GLASS	900	1500	1500	1500	1400	1200	1500	2500
VICK	700	1250	1250	1250	1250	1250	1080	1440
TOTAL AVG.	774	1201	1261	1282	1233	1341	1263	1877

Table 4-75

Literature Review of Square Foot Standards/Recommendations for Vocational/Industrial/Business Education Classroom Space

	HOME ECONOMICS	GENERAL AGRICULTURE	TYPING/WORD PROCESSING
DELAWARE		3200	
FLORIDA			
GEORGIA	1350	3600	
ILLINOIS	2240	2600	
INDIANA	1200		1200
KENTUCKY			
MAINE	1400	2400	
MARYLAND			
MICHIGAN	2000		
N. CAROLINA	1500	2750	
OKLAHOMA	2100	2500	1125
PENNSYLVANIA			
S. CAROLINA			
TENNESSEE	2080	2400	1000
VERMONT			
VIRGINIA	1600	3400	1230
STATE AVG.	1719	2856	1139
GRAVES	2100	2500	1125
CASTALDI	1300	2500	
CANDOLI	1250	2600	1250
HERMAN	1400	2500	1125
GLASS	2100	2800	1200
VICK	1800	2400	1000
TOTAL AVG.	1667	2593	1139

Table 4-76

Literature Review of Square Foot
Standards/Recommendations for
Special Education Classroom Space

	EDUCABLE MENTALLY RETARDED	TRAINABLE MENTALLY RETARDED	SEVERE AND PROFOUND	PHYSICALLY HANDICAPPED	EMOTIONALLY DISTURBED	GIFTED AND TALENTED
DELAWARE						
FLORIDA						
GEORGIA						
ILLINOIS	925	925	925	925	925	925
INDIANA	900	900	900	900	900	
KENTUCKY						
MAINE						
MARYLAND						
MICHIGAN	900	900	900	900	900	
N. CAROLINA	975	975	975	975	975	
OKLAHOMA	750	725	688	720	720	
PENNSYLVANIA						
S. CAROLINA	720	720	720	720	720	
TENNESSEE						
VERMONT						
VIRGINIA	615	900	780		550	
STATE AVG.	826	864	841	857	813	925
GRAVES	750	725	688	720	720	
CASTALDI	950	950	950	950	950	950
CANDOLI	750	750	700	800	800	750
HERMAN	750	800	950	950	720	950
GLASS	1000	1000	1000	1000	1000	1000
VICK	1080	1260	2250	1440	1440	450
TOTAL AVG.	872	907	1054	959	920	717

The Mann-Whitney U technique was used to discover significant differences between the superintendents and the literature. This test was selected due to the varying number of cases in each group and the limited degree of the homogeneity of variance between the groups. The level of significance used for these analyses was 0.01. Each category of educational space was analyzed and reported separately in the following order:

Elementary Spaces

1. Prekindergarten
2. Kindergarten
3. Grades one through four
4. Grades five and six
5. Elementary art
6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art

19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

Categorical Description by Group

Elementary Educational Spaces

The elementary education group was composed of six categories. These categories were prekindergarten, kindergarten, grades 1-4, grades 5-6, art, and music.

An analysis of the recommendations reported by participating superintendents, the literature, and the combination of both were made to determine the number of responses, mean, median, mode, and standard deviation of each. These findings are described in Tables 4-77 through 4-82.

The Mann-Whitney U test was then performed to determine if significant differences existed between the participating superintendents and the literature. The findings of the Mann-Whitney U test are described in Table 4-106.

Table 4-77

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Prekindergarten

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	71	885	900	900	206.6
Literature	6	1077	1050	1100	235.1
Total	77	900	900	900	213.6

Table 4-78

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Kindergarten

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	73	888	900	900	209.0
Literature	19	1044	1000	1100	206.8
Total	92	920	900	900	216.9

Table 4-79

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of Grades 1-4

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	73	797	750	750	171.9
Literature	19	853	840	800	122.2
Total	92	809	778	750	163.8

Table 4-80

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of Grades 5-6

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	73	799	760	750	167.6
Literature	19	853	840	800	122.2
Total	92	810	780	750	160.2

Table 4-81

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of Elementary Art

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	69	1010	1000	1000	281.1
Literature	14	1033	1000	1000	194.9
Total	83	1014	1000	1000	267.6

Table 4-82

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of Elementary Music

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	71	1068	1000	900	422.3
Literature	14	932	938	1000	230.4
Total	85	1046	1000	900	399.2

Junior High/Middle School Educational Spaces

The junior high/middle school group was composed of six categories. These categories were general classroom space (grades 6-9), science, art, choral music, instrumental music, and homemaking laboratory.

An analysis of the recommendations reported by participating superintendents and the literature were examined, both separately and in total, to determine the number of responses, mean, median, mode, and standard deviation of each. These findings are described in Tables 4-83 through 4-88.

The Mann-Whitney U test was then performed to determine if significant differences existed between the participating superintendents and the literature. The findings of the Mann-Whitney U test are described in Table 4-106.

Table 4-83

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of Grades 6-9 General Classrooms

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	72	793	768	750	209.5
Literature	18	769	800	800	103.6
Total	90	788	772	750	192.8

Table 4-84

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of Middle School/Junior High Science

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	73	1102	1100	1200	312.2
Literature	11	1193	1200	950	219.1
Total	84	1114	1100	1200	302.1

Table 4-85

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of Middle School/Junior High Art

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	72	1099	1036	1000	351.6
Literature	15	1308	1200	1200	328.4
Total	87	1135	1100	1200	354.9

Table 4-86

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Middle School/Junior High Choral Music

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	71	1154	1100	1000	401.6
Literature	15	1142	1175	950	194.0
Total	86	1152	1100	1000	372.9

Table 4-87

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Middle School/Junior High Instrumental Music

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	73	1642	1500	1200	831.2
Literature	14	1373	1250	1050	423.2
Total	87	1599	1400	1500	784.5

Table 4-88

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Middle School/Junior High Homemaking

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	64	1398	1200	1000	614.7
Literature	7	1371	1400	1425	240.8
Total	71	1396	1300	1000	587.4

High School Educational Spaces

The high school group was composed of eight categories. These categories were general classroom space (grades 9-12), physical science, biology, chemistry, physics, art, choral music, and instrumental music.

An analysis of the recommendations reported by participating superintendents and the literature were examined, both separately and in total, to determine the number of responses, mean, median, mode, and standard deviation of each. These findings are described in Tables 4-89 through 4-96.

The Mann-Whitney U test was then performed to determine if significant differences existed between the participating superintendents and the literature. The findings of the Mann-Whitney U test are described in Table 4-106.

Table 4-89

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of High School General Classroom

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	71	804	780	750	170.1
Literature	18	786	738	625	205.2
Total	89	800	768	750	176.7

Table 4-90

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Physical Science

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	72	1178	1113	1000	360.3
Literature	15	1250	1200	1200	224.0
Total	87	1191	1200	1200	340.7

Table 4-91

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Biology

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	71	1205	1200	1200	367.2
Literature	14	1268	1213	1200	221.2
Total	85	1216	1200	1200	347.1

Table 4-92

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Chemistry

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	71	1243	1200	1200	375.3
Literature	14	1324	1250	1200	196.9
Total	85	1256	1200	1200	352.6

Table 4-93

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Physics

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	70	1217	1200	1200	381.2
Literature	14	1281	1213	1200	198.4
Total	84	1228	1200	1200	357.1

Table 4-94

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of High School Art

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	72	1243	1200	1200	466.5
Literature	15	1368	1260	1200	245.3
Total	87	1265	1200	1200	437.9

Table 4-95

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of High School Choral Music

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	70	1562	1520	2000	711.1
Literature	14	1245	1220	1200	219.2
Total	84	1509	1400	1200	664.8

Table 4-96

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of High School Instrumental Music

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	71	2417	2250	2000	1122.4
Literature	15	1827	1620	1400	636.8
Total	86	2314	2000	2000	1074.7

Vocational/Industrial/Business Educational Spaces

The vocational/industrial/business group was composed of three categories. These categories were home economics, general agriculture shop, and typing/word processing.

An analysis of the recommendations reported by participating superintendents and the literature were examined, both separately and in total, to determine the number of responses, mean, median, mode, and standard deviation of each. These findings are described in Tables 4-97 through 4-99.

The Mann-Whitney U test was then performed to determine if significant differences existed between the participating superintendents and the literature. The findings of the Mann-Whitney U test are described in Table 4-106.

Table 4-97

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Home Economics

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	70	1656	1450	1200	806.1
Literature	15	1695	1600	2100	376.1
Total	85	1663	1500	1200	746.7

Table 4-98

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of General Agriculture Shop

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	65	2279	2000	2000	1107.2
Literature	14	2725	2550	2500	392.6
Total	79	2358	2400	2400	1030.0

Table 4-99

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Typing/Word Processing

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	70	1148	1000	1000	416.6
Literature	9	1139	1125	1125	91.7
Total	79	1147	1092	1000	393.0

Special Education Educational Spaces

The special education group was composed of six categories. These categories were educable mentally retarded, trainable mentally retarded, severely and profoundly retarded, physically handicapped, emotionally disturbed, and gifted and talented.

An analysis of the recommendations reported by participating superintendents and the literature were examined, both separately and in total, to determine the number of responses, mean, median, mode, and standard deviation of each. These findings are described in Tables 4-100 through 4-105.

The Mann-Whitney U test was then performed to determine if significant differences existed between the participating superintendents and the literature. The findings of the Mann-Whitney U test are described in Table 4-106.

Table 4-100

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Educable Mentally Retarded

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	70	820	750	600	307.5
Literature	13	851	900	750	136.6
Total	83	825	750	750	287.1

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Table 4-101

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Trainable Mentally Retarded

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	71	863	750	750	342.6
Literature	13	887	900	900	150.6
Total	84	867	750	750	319.9

Table 4-102

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Severe and Profound

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	71	960	768	500	514.8
Literature	13	956	900	688	406.2
Total	84	959	800	900	497.4

Table 4-103

Number, Mean, Median, Mode, and Standard Deviation of Recommendations of Participants, Literature, and Summary Total for the Educational Space of Physically Handicapped

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	69	932	800	750	382.4
Literature	12	917	913	720	194.6
Total	81	930	800	900	359.9

Table 4-104

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of Emotionally Disturbed

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	70	858	750	750	333.1
Literature	13	873	900	720	214.7
Total	83	860	768	720	316.4

Table 4-105

Number, Mean, Median, Mode, and Standard Deviation
of Recommendations of Participants, Literature, and Summary Total
for the Educational Space of Gifted and Talented

Category	Number	Mean	Median	Mode	Standard Deviation
Participants	69	754	732	600	261.6
Literature	5	815	925	450	224.7
Total	74	758	750	600	258.4

TABLE 4-106

Mann-Whitney U Significance Test Between the Recommendations of Participants and the Literature for the Selected Educational Spaces

Educational Space	2-tailed P
Elementary Spaces	
Prekindergarten	0.0232
Kindergarten	0.0011
Grades 1-4	0.0343
Grades 5-6	0.0384
Art	0.6230
Music	0.1605
Middle School/Junior High Spaces	
Grades 6-9	0.7379
Science	0.2325
Art	0.0187
Choral Music	0.9954
Instrumental Music	0.2157
Homemaking Laboratory	0.5048
High School Spaces	
Grades 9-12	0.1661
Physical Science	0.1743
Biology	0.2301
Chemistry	0.1996
Physics	0.2240
Art	0.0497
Choral Music	0.2046
Instrumental Music	0.0295
Vocational/Industrial/Business Spaces	
Home Economics Laboratory	0.1977
General Agriculture Shop	0.0101
Typing/Word Processing	0.3689
Special Education Spaces	
Educable Mentally Retarded	0.1163
Trainable Mentally Retarded	0.0896
Severe and Profound	0.3692
Physically Handicapped	0.2894
Emotionally Disturbed	0.2301
Gifted and Talented	0.2178

Summary

The results of the Mann-Whitney U test suggest that there is reason to suspect that there are differences between the perceptions of superintendents and the recommendations from the literature regarding the square footage necessary to provide an adequate education in several areas.

Perceptions of superintendents appear to differ significantly from the literature in the area of kindergarten and approach significance in the educational spaces of middle school/junior high art and general agriculture shop (Table 4-106).

CHAPTER FIVE

Summary of the Study

Educational equity, adequacy, and efficiency relate directly to the opportunity for children to receive a quality education. These concepts, however, transcend the responsibilities placed on professional personnel and include the actual physical spaces in which a child is educated. It is given that the instructional components of people, supplies, and technology play a vital role in the adequate education of a child, it is also suggested that a large supporting role is played by the size of the educational spaces with which professional personnel deliver instruction and in which students receive instruction.

The Supreme Court of Texas recognized the importance of adequate facilities when it delivered its opinion in Edgewood v. Kirby on October 2, 1989 (Edgewood v. Kirby, 1989). In addition, the Texas Legislature recognized the importance that facilities play in the education of children. They, therefore, required that educational facilities be inventoried and a set of standards brought forth before state participation in the financing of school facilities would be considered (Senate Bill 1019, 1989).

This study was undertaken for several reasons. The primary purpose was to provide research data to support state participation in the financing of school facilities. Secondly, to discover if school district wealth was a significant factor for consideration for state-wide policy development and the development and implementation of facility standards. In addition, this study was to discover if the size of school districts was a significant factor for consideration in the development of policy and the implementation of standards. Also, this study was intended to discover if practitioner perception of the space necessary for an adequate education was significantly different from those standards of other states, the recommendations of the literature, and the recommendations of experts in the facility arena. Finally, this study was to provide a basis for the planning of school facilities.

The above questions were addressed by testing the following three null hypotheses:

1. There is no difference between the standards recommended by practitioners, in school districts with above average wealth and those of below average wealth, pertaining to educational space for:

   Elementary Spaces

    1. Prekindergarten
    2. Kindergarten
    3. Grades one through four
    4. Grades five and six
    5. Elementary art
    6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound

27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

2. There is no difference between the standards for educational space recommended by practitioners, from school districts of various enrollment groups, for :

Elementary Spaces

1. Prekindergarten
2. Kindergarten
3. Grades one through four
4. Grades five and six
5. Elementary art
6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology

16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

3. There is no difference between the standards for educational space recommended by practitioners and those recommended by the literature with respect to:

Elementary Spaces

1. Prekindergarten
2. Kindergarten
3. Grades one through four
4. Grades five and six

5. Elementary art
6. Elementary music

Junior High/Middle School Spaces

7. General classroom
8. Science
9. Art
10. Choral music
11. Instrumental music
12. Homemaking laboratory

High School Spaces

13. General classroom
14. Physical science
15. Biology
16. Chemistry
17. Physics
18. Art
19. Choral music
20. Instrumental music

Vocational/Industrial/Business Education Spaces

21. Home economics
22. General agriculture shop
23. Typing/Word processing

Special Education Spaces

24. Educable mentally retarded
25. Trainable mentally retarded
26. Severe and profound
27. Physically handicapped
28. Emotionally disturbed
29. Gifted and talented

This study surveyed superintendents (or their designees) from school districts of above average state wealth and below average state wealth to discover if the perception of need for an adequate education was different between these two groups. This study also surveyed superintendents (or their designees) from school districts in varying enrollment groups to discover if the size of the district had an influence in the perception of adequacy in the educational spaces necessary for an education.

In addition, the relevant professional literature, including standards of other states and expert opinion, was substantively reviewed and then compared to the recommendations of practitioners to discover if there were any differences between these two groups pertaining to the physical space necessary to receive an adequate education.

Methodology

In this study, superintendents (or their designees) were asked to complete a survey which sought their recommendations for the amount of square footage necessary to deliver an adequate education in the selected educational spaces of the study. The sample population consisted of 120 superintendents selected by random sampling and stratified by wealth and pupil enrollment. There were 79 (65.8%) total responses of which six were unable to be used.

This study surveyed superintendents (or their designees) from school districts of above average state wealth and below average state wealth to discover if the perception of need for an adequate education was different between these two groups. This study also surveyed superintendents (or their designees) from school districts in varying enrollment groups to discover if the size of the district had an influence in the perception of adequacy in the educational space necessary for an education.

In addition, the literature (including standards of other states and expert opinion) was substantively reviewed and then compared to the recommendations of practitioners to discover if there were any differences between these two groups pertaining to the space necessary to receive an adequate education.

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The perceptions of practitioners were compared to each other and with the literature to determine if multiple standards should be considered for varying size and wealth school districts.

The selection of the educational space variables was made on the basis of their prevalence in the instructional setting. The impact of the perceptions of practitioners and the recommendations of the literature on these selected spaces were analyzed to discover any differences.

Limitations of the Study

Certain limitations in this study should be noted. The clarification of questions and interpretations of responses are not practical for a large survey sampling. The assumption that all participants completed the instrument with a full understanding of the task is a limitation that is noted in the findings.

An attempt to minimize the statistical limitation derived from the limited homogeneity of variances between groups was undertaken through the use of non-parametric statistics.

The selection of 15 participants through stratified random sampling in each category of wealth and enrollment may be viewed as a limitation. While enough participants were secured to provide an adequate sampling, the variance related to the percentages of participants to total in each group was mixed (Table 3-2). In addition, as with any random sampling technique, it is possible for providence to deliver a skewed sample.

It may also be viewed as a limitation that the perceptions of teachers and principals have not been included. The experiences of those directly involved in the educational process at the classroom level may bring much to the understanding and planning of educational facility standards.

This study does not solicit the input of architects. The perceptions of those architects experienced in the design, construction, and development of educational specifications for educational specifications for school facilities may add much to the overall body of knowledge pertinent to the development of facility standards.

Findings of the Study

The study examined five categories of educational space. These categories of educational space were elementary, junior high and middle school, high school, vocational/industrial/business, and special education spaces.

Each category was further subdivided into specific grade-level or program-level components. These categories and their components were:

A. Elementary
    1. Prekindergarten

   2. Kindergarten
   3. Grades 1-4
   4. Grades 5 and 6
   5. Art
   6. Music

B. Middle School/Junior High
   1. General classroom (Grades 6-9)
   2. Science
   3. Art
   4. Choral music
   5. Instrumental music
   6. Homemaking

C. High School
   1. General classroom (Grades 9-12)
   2. Physical science
   3. Biology
   4. Chemistry
   5. Physics
   6. Art
   7. Choral music
   8. Instrumental music

D. Vocational/Industrial/ and Business
   1. Home economics
   2. General agriculture

    3. Typing/Word processing

E. Special Education

    1. Educable mentally retarded
    2. Trainable mentally retarded
    3. Severely and profoundly retarded
    4. Physically handicapped
    5. Emotionally disturbed
    6. Gifted and talented

Each category and its corresponding subcategory of educational space is addressed individually with respect to the three hypotheses of this study. These hypotheses in abbreviated form stated:

1. There is no difference between the perceptions of superintendents of below state average wealth school districts and superintendents from above state average wealth school districts pertaining to the square footage needed to provide an adequate education in the selected spaces.
2. There is no difference between the perceptions of superintendents from school districts of varying student enrollments pertaining to the square footage needed to provide an adequate education in the selected spaces.

3. There is no difference between the recommendations of the literature (including standards of other states and experts surveyed) and practitioners regarding the square footage necessary to provide an adequate education in selected spaces.

The terminology used in null hypothesis two, pertaining to student enrollment groups, are defined as follows:

Enrollment group one	10,000 or more
Enrollment group two	3,000 to 9,999
Enrollment group three	1,000 to 2,999
Enrollment group four	999 or less

The statistical technique chosen to address null hypothesis one was the Analysis of Variance (ANOVA) procedure. The threshold chosen to determine significance was 0.05. The data met all criteria for this parametric test.

The statistical technique chosen to address null hypotheses two and three was the Mann-Whitney U (M-W) procedure. This non-parametric procedure was chosen because of the limited homogeneity of variance between the groups of enrollment in hypothesis one and the groups of literature and practitioners in hypothesis two. The threshold chosen to determine significance was 0.01.

Elementary Educational Spaces

The category of elementary educational spaces was subdivided into six areas for analysis. These areas were prekindergarten, kindergarten, grades one through four, grades five and six, art, and music.

The findings suggest that there are no significant differences between the perceptions of superintendents from above and below state average wealth pertaining to the square footage needed to provide an adequate education in the elementary education area. The ANOVA procedure yielded an F-Probability ranging from a low of 0.3977 for music to a high of 0.8530 for prekindergarten. The only space with an F-Probability below 0.6400 was music (0.3977).

Prekindergarten

Analysis of the prekindergarten educational space using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.1819 in between enrollment groups one and four to a high of 0.9861 between enrollment groups two and three.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure

(0.0232) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample. Significance, however, is approached between these two groups.

Kindergarten

Analysis of the kindergarten educational space using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.1256 between enrollment groups one and four to a high of 0.9861 between enrollment groups two and three.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.0011) suggest a significant difference does exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Grades 1-4

Analysis of the educational space in grades 1-4 using the M-W test (two-tailed P) revealed a significant difference between enrollment groups one and two (0.0060). This procedure also revealed that the differences between enrollment groups one and three (0.0441) and between enrollment groups one and four (0.0115) approached significance. The range was from a low of 0.0060 between enrollment groups one and two to a high of 0.8077 between enrollment groups two and three.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.0343) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample. Significance, however, is approached between these two groups.

Grades 5 and 6

Analysis of the grades 5 and 6 educational space using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. There were, however, two sets of groups which approached significance. The significance level between enrollment groups one and four was 0.0161 and between groups three and four was 0.0668. The range was from a low of 0.0161 between enrollment groups one and four to a high of 0.8181 between enrollment groups one and three.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also

performed using the M-W technique. The findings of this procedure (0.0384) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample. Significance, however, is approached between these two groups.

Art

Analysis of the educational space for art using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.3219 between enrollment groups one and four to a high of 0.9089 between enrollment groups two and three.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.6230) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Music

Analysis of the educational space for music using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups.

The range was from a low of 0.1485 between enrollment groups three and four to a high of 0.5006 between enrollment groups two and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.1605) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Middle School and Junior High Educational Spaces

The category of middle school and junior high educational spaces was subdivided into six areas for analysis. These areas were general classroom, science, art, choral music, instrumental music, and homemaking.

The findings suggest that there are no significant differences between the perceptions of superintendents from above and below state average wealth pertaining to the square footage needed to provide an adequate education in the middle school/junior high area. The ANOVA procedure yielded an F-Probability ranging from a low of 0.2091 in homemaking to a high of 0.8855 in choral music.

General Classroom

Analysis of the middle school/junior high general classroom space using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. There were, however, three sets of enrollment groups which approached significance. These were enrollment groups one and four (0.0768), two and four (0.0615), and three and four (0.0672). The range was from a low of 0.0615 between enrollment groups two and four to a high of 0.8337 between enrollment groups two and three.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.7379) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Science

Analysis of the educational space for science using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.2318 between enrollment groups two and three to a high of 0.8403 between enrollment groups one and three.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.2325) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Art

Analysis of the educational space for art using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. Significance, however, was approached between enrollment groups one and three (0.0952). The range was from a low of 0.0952 between enrollment groups one and three to a high of 0.9044 between enrollment groups three and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.0187) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample. Significance, however, is approached between these two groups.

Choral Music

Analysis of the educational space for choral music using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.1060 between enrollment groups two and three to a high of 0.9334 between enrollment groups three and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.9954) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Instrumental Music

Analysis of the educational space for instrumental music using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.4468 between enrollment groups two and three to a high of 0.9089 between enrollment groups one and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure

(0.2157) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Homemaking

Analysis of the homemaking educational space using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. Significance was, however, approached between enrollment groups one and three (0.0750). The range was from a low of 0.0750 between enrollment groups one and three to a high of 0.8026 between enrollment groups two and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.5048) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

High School Educational Spaces

The high school group was comprised of eight subcategories of space. These spaces were general classroom, physical science, biology, chemistry, physics, art, choral music, and instrumental music.

The findings suggest that there are no significant differences between the perceptions of superintendents from above and below state average wealth pertaining to the square footage needed to provide an adequate education in the high school area. The ANOVA procedure yielded an F-Probability ranging from a low of 0.3803 in choral music to a high of 0.9381 in chemistry. Six of the eight spaces had an F-Probability higher than 0.6900. The only spaces below this level were biology (0.4487) and choral music (0.3803).

General Classroom

Analysis of the high school general classroom educational space using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. Significance, however, was approached between enrollment groups one and four (0.0957), enrollment groups two and three (0.0532), and enrollment groups three and four (0.0164). The range was from a low of 0.0164 between enrollment groups three and four to a high of 0.4839 between enrollment groups one and two.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.1661) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Physical Science

Analysis of the educational space for science using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.2499 between enrollment groups one and three to a high of 0.7781 between enrollment groups one and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.1743) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Biology

Analysis of the educational space for biology using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.1825 between enrollment groups one and three to a high of 0.9136 between enrollment groups two and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.2301) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Chemistry

Analysis of the educational space for chemistry using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. Significance, however, was approached between enrollment groups one and three (0.0914). The range was from a low of 0.0914 between enrollment groups one and three to a high of 0.7860 between enrollment groups two and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.1996) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Physics

Analysis of the educational space for physics using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.2129 between enrollment groups one and three to a high of 0.8779 between enrollment groups one and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.2240) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Art

Analysis of the educational space for art using the M-W test (two-tailed P) revealed a significant difference between the perceptions of superintendents in enrollment groups two and three (0.0088). In addition, significance was approached between enrollment groups one and three (0.0125). The range was from a low of 0.0088 between enrollment groups two and three to a high of 0.8748 between enrollment groups one and two.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also

performed using the M-W technique. The findings of this procedure (0.0497) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample. Significance, however, is approached between these two groups.

Choral Music

Analysis of the educational space for choral music using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. Significance was approached between several sets of enrollment groups. These were between enrollment groups one and three (0.0253), enrollment groups one and four (0.0972), and enrollment groups two and three (0.0760). The range was from a low of 0.0253 between enrollment groups one and three to a high of 0.7211 between enrollment groups three and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.2046) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Instrumental Music

Analysis of the educational space for instrumental music using the M-W test (two-tailed P) revealed significant differences between the perceptions of superintendents in two sets of enrollment groups. These enrollment groups were one and three (0.0043) and two and three (0.0056). The range was from a low of 0.0043 between enrollment groups one and three to a high of 0.9660 between enrollment groups one and two.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.0295) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample. Significance, however, is approached between these two groups.

Vocational/Industrial/Business Educational Spaces

The vocational/industrial/business category was divided into three subcategories of educational space. These components were home economics, general agriculture, and typing/word processing.

The findings suggest that there are no significant differences between the perceptions of superintendents from above and below state average wealth pertaining to the square footage needed to provide an adequate education in the vocational/

industrial/business area. The ANOVA procedure yielded the F-Probabilities of 0.5562 in home economics, 0.5521 in general agriculture, and 0.1530 in typing/word processing.

Home Economics

Analysis of the educational space for home economics using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. Significance was approached, however, between the two sets of enrollment groups of one and three (0.0409) and one and four (0.0744). The range was from a low of 0.0409 between enrollment groups one and three to a high of 0.9710 between enrollment groups two and three.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.1977) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

General Agriculture

Analysis of the educational space for general agriculture using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.2879 between enrollment groups two and four to a high of 0.9600 between enrollment groups one and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.0101) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample. Significance, however, is approached between these two groups.

Typing and Word Processing

Analysis of the educational space for typing/word processing using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.4308 between enrollment groups one and three to a high of 0.9433 between enrollment groups one and two.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.3689) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Special Education Spaces

The special education group was divided into six subcategories of space. These subcategories were educable mentally retarded, trainable mentally retarded, severely and profoundly retarded, physically handicapped, emotionally disturbed, and gifted and talented.

The findings suggest that there are no significant differences between the perceptions of superintendents from above and below state average wealth pertaining to the square footage needed to provide an adequate education in the special education area. The ANOVA procedure yielded a range in F-Probabilities from a low of 0.2915 in severely and profoundly retarded educational spaces to a high of 0.9020 for trainable mentally retarded educational spaces.

Educable Mentally Retarded

Analysis of the educational space for educable mentally retarded using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.1262 between enrollment groups one and three to a high of 0.6823 between enrollment groups one and two.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.1163) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Trainable Mentally Retarded

Analysis of the educational space for trainable mentally retarded using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. Significance, however, was approached between enrollment groups two and three (0.0720). The range was from a low of 0.0720 between enrollment groups two and three to a high of 0.8915 between enrollment groups one and two.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.0896) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample. Significance, however, is approached between these two groups.

Severe and Profound

Analysis of the educational space for severely and profoundly retarded using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. Significance, however, was approached between enrollment groups one and three (0.0528). The range was from a low of 0.0528 between enrollment groups one and three to a high of 0.7333 between enrollment groups one and two.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.3692) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Physically Handicapped

Analysis of the educational space for physically handicapped using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.1086 between enrollment groups two and three to a high of 0.9662 between enrollment groups one and two.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also

performed using the M-W technique. The findings of this procedure (0.2894) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Emotionally disturbed

Analysis of the educational space for emotionally disturbed using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. Significance, however, was approached between enrollment groups one and three (0.0418) and enrollment groups two and three (0.0634). The range was from a low of 0.0418 between enrollment groups one and three to a high of 0.7023 between enrollment groups one and two.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.2301) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Gifted and Talented

Analysis of the educational space for gifted and talented using the M-W test (two-tailed P) revealed no significant differences between the perceptions of superintendents from the various enrollment groups. The range was from a low of 0.1161 between enrollment groups one and two to a high of 0.8582 between enrollment groups three and four.

Analysis of the differences between the recommendations of the literature and the perceptions of superintendents was also performed using the M-W technique. The findings of this procedure (0.2178) suggest no significant differences exist between the recommendations of the literature and the perceptions of the superintendents in the sample.

Summary of Findings

The findings of the analysis undertaken to test null hypothesis one, pertaining to differences in perceptions between superintendents in above and below state average wealth school districts, presented no reason to suspect that differences existed in any of the selected educational spaces.

The findings of the analysis undertaken to test null hypothesis two, pertaining to differences in perceptions between superintendents in varying enrollment groups, suggested that significant differences exist in three subcategories of educational space. These three spaces were in grades one through four, high school art, and high school instrumental music.

In the area of grades one through four, significant differences (P=0.0060) were suggested between enrollment groups one (10,000 or more) and two (3,000 to 9,999). In the area of high school art, significant differences (P=0.0088) were suggested between enrollment groups two (3,000 to 9,999) and three (1,000 to 2,999). In the area of high school instrumental music, significant differences were suggested between enrollment groups one (10,000 or more) and three (1,000 to 2,999) (P=0.0043) and enrollment groups two (3,000 to 9,999) and three (1,000 to 2,999) (P=0.0056).

The findings of the analysis undertaken to test null hypothesis three, pertaining to differences in perceptions between the recommendations of the literature and the perceptions of practitioners, suggested that significant differences exist in the educational space of kindergarten (P=0.0011).

While much of this study deals with the perceptions of practitioners, it may be noted that there is, overall, much agreement between the recommendations of practitioners and those of other states, experts, and the literature.

Implications for Policy-Making

The absence of statistical significances between practitioners' perceptions in the two groups of below state average wealth and above state average wealth implies that the concept of adequacy in educational space may not be a factor of the wealth of a school district. Significant findings in only three of the 29 educational space variables studied further suggest that enrollment is not a major factor in the concept of adequacy in educational space.

Findings in the differences between the literature and practitioners are varied. When these two groups are compared, the number of educational space variables yielding a significance level of 0.10 or below is nine; the number yielding a significance level between 0.11 and 0.20 is six; the number yielding a significance level between 0.21 and 0.30 is eight; and the number yielding a significance level of 0.31 or greater is the remaining six from a total of 29. These findings suggest a weak relationship between the perceptions (knowledge) of practitioners and the recommendations of the literature. Within the parameters of the literature itself, it is evident that substantial differences in recommendations occur in virtually every selected educational space (Tables 4-72 through 4-76).

Recommendation of Standards

In recommending standards for educational space, the concepts of a single number versus a range was considered. By couching a recommendation in a single number, the prospect of that number becoming a ceiling is created. Also, if a minimum number were recommended for any given educational space, the standard may become a target for adequacy. The same arguments may be made for a range, but the impact is somewhat minimized. Therefore, the recommendations for the square feet necessary to provide an adequate education in the spaces selected for examination are expressed in a range by this study.

Further support for a recommendation in the form of a range is provided by the data itself. The lack of consensus of the literature, experts, and practitioners supports a recommendation couched in terms of a range. This research suggests that adequate space may be seen as a function of such inter-related variables as teaching methodology, community expectation, and flexibility for future utilization. In addition, the range recommended by this research should not be considered a panacea for space requirements, but an addition to the body of knowledge pertaining to the adequacy of the physical space necessary to provide an adequate education in the selected educational spaces included in this study.

The recommendations emerging from this study were derived from the mean of the average square footage of the other state standards, expert recommendations, and the recommendations of the surveyed practitioners (Table 5-1). The recommendation for each variable was determined by applying a five percent variance above and below the average of the three means (Table 5-2).

Table 5-1

Averages of Recommendations from Practitioners, States, and Experts with Five Percent Variance for Selected Educational Spaces

Spaces	Average of Practitioners	Average of States	Average of Experts	Mean	95% of Mean	105% of Mean
Elementary						
Prekindergarten	885	1,030	1,100	1,005	955	1,055
Kindergarten	888	1,029	1,075	997	947	1,047
Grades 1-4	797	835	892	841	799	883
Grades 5-6	799	835	892	842	800	884
Art	1,010	1,001	1,090	1,034	982	1,085
Music	1,068	861	1,060	996	947	1,046
Middle School/Junior High						
Grades 6-9	793	757	800	783	744	823
Science	1,102	1,204	1,180	1,162	1,104	1,220
Art	1,099	1,391	1,183	1,224	1,163	1,286
Choral Music	1,154	1,142	1,142	1,146	1,089	1,203
Instrumental Music	1,642	1,372	1,375	1,463	1,390	1,536
Homemaking Lab	1,398	1,425	1,363	1,395	1,326	1,465
High School						
Grades 9-12	804	790	775	790	750	829
Physical Science	1,178	1,292	1,187	1,219	1,158	1,280
Biology	1,205	1,274	1,260	1,246	1,184	1,309
Chemistry	1,243	1,366	1,268	1,292	1,228	1,357
Physics	1,217	1,329	1,218	1,255	1,192	1,317
Art	1,243	1,387	1,332	1,321	1,255	1,387
Choral Music	1,562	1,227	1,270	1,353	1,285	1,421
Instrumental Music	2,417	1,783	1,893	2,031	1,929	2,133
Vocational/Industrial Technology/Business						
Home Economics Lab	1,656	1,719	1,658	1,678	1,594	1,762
General Agriculture Shop	2,279	2,856	2,550	2,562	2,434	2,690
Typing/Word Processing	1,148	1,139	1,140	1,142	1,085	1,199
Special Education						
Educable Mentally Retarded	820	826	880	842	800	884
Trainable Mentally Retarded	863	864	914	880	836	924
Severely & Profoundly Retarded	960	841	1,090	964	915	1,012
Physically Handicapped	932	857	977	922	876	968
Emotionally Disturbed	858	817	938	871	827	915
Gifted & Talented	754	925	788	822	781	863

Table 5-2

Standards for Selected Educational Spaces
Expressed in Square Feet

Spaces	Enrollment	From	To
Elementary			
Prekindergarten	20-25	955	1,055
Kindergarten	20-26	947	1,047
Grades 1-4	20-24	799	883
Grades 5-6	24-26	800	884
Art	25-27	982	1,085
Music	25-27	947	1,046
Middle School/Junior High			
General Classroom	25-27	744	823
Science	29-30	1,104	1,220
Art	25-28	1,163	1,286
Choral Music	28-32	1,089	1,203
Instrumental Music	28-32	1,390	1,536
Homemaking Lab	24-28	1,326	1,465
High School			
General Classroom	25-28	750	829
Physical Science	25-28	1,158	1,280
Biology	25-28	1,184	1,309
Chemistry	25-28	1,228	1,357
Physics	25-28	1,192	1,317
Art	28-29	1,255	1,387
Choral Music	45-65	1,285	1,421
Instrumental Music	50-75	1,929	2,133
Vocational/Industrial Technology/Business			
Home Economics Lab	24-28	1,594	1,762
General Agriculture	18-22	2,434	2,690
Typing/Word Processing	24-25	1,085	1,199
Special Education			
Educable Mentally Retarded	5-18	800	884
Trainable Mentally Retarded	10-18	836	924
Severely & Profoundly Retarded	3-18	915	1,012
Physically Handicapped	5-18	876	968
Emotionally Disturbed	5-18	827	915
Gifted & Talented	6-15	781	863

Suggestions for Further Study

The perceptions of individuals may be as important as reality when discussing the adequacy of space. A survey of teachers and principals, similar to the survey in this study, may add additional information to the body of knowledge pertaining to facility adequacy. The results of this survey could then be compared to the opinion of program specialists to support or expand the standards recommended through this study.

Further research is needed in the area of educational space standards to determine the impact of physical space on student productivity. Does additional educational space increase the opportunity for learning? Relating the square footage of an educational space to student outcomes may be considered if controls can be placed on such intervening variables as teacher ability; the student's home environment, socioeconomic status, and parents' education; and the attitudes of students, teachers, parents, and administrators.

A nation-wide study to discover if cultural variables exist between different segments of the nation may be considered. Such a study may suggest standards to be considered nationally for the development of spaces to support a national curriculum or a national program of study.

The perceptions of architects specializing in the construction and design of educational facilities may be valuable in the determination of facility standards. A survey of architects soliciting input of the type found in this study may provide useful information for the development of standards.

Considerations should also be given to the manner in which a public policy of this nature is instituted. The bureaucratic parameters which normally surround state-wide program initiation and implementation should be carefully studied to avoid lengthy time-frames for the administration of funds. Furthermore, care should be given to avoid allowing standards to become maximums.

APPENDIX A

SURVEY POPULATION

LISTING OF DISTRICTS IN EACH COMPARISON GOUP

ENROLLMENT OVER 10,000 AND WEALTH ABOVE AVERAGE

District Name	Enrollment	Wealth*
Alief	26893	215501
Arlington	42153	309359
Austin	62733	340056
Beaumont	20641	239893
Birdville	17583	231921
Brazosport	11591	369886
Carrollton-Farmers Branch	16058	554034
Clear Creek	20694	269693
Cypress-Fairbanks	36324	248339
Dallas	130904	401387
Denton	10147	272246
Fort Worth	68033	233708
Garland	34923	221056
Goose Creek	16803	283668
Houston	190290	280770
Hurst-Euless-Bedford	17825	276359
Irving	21797	348245
Katy	17139	245251
Lamar Consolidated	11534	233526
Lewisville	18561	262092
North East	39087	316122
Northside	48528	221872
Plano	28724	404063
Port Arthur	12154	255419
Richardson	32211	435713
Round Rock	18138	225107
Spring Branch	25522	348173
Tyler	16311	216343

ENROLLMENT OVER 10,000 AND WEALTH BELOW AVERAGE

Abilene	18667	138861
Aldine	37983	180714
Amarillo	27307	159566
Brownsville	35898	53470
Bryan	11047	167368
Conroe	21544	185287
Corpus Christi	41419	146449
Ector County	26258	183904
Edgewood	15409	40223
Edinburg	14709	87704
El Paso	63169	123262
Fort Bend	31104	168493

Galena Park	14512	150932
Grand Prairie	16299	157212
Harlandale	14941	59945
Harlingen	14561	87539
Humble	17982	170863
Judson	12736	188103
Killeen	22892	75916
Klein	24465	146415
Laredo	23042	46826
Lubbock	30953	149943
McAllen	20652	109563
Mesquite	23724	169461
Midland	19946	206008
North Forest	12900	62446
Pasadena	35420	147446
Pharr-San Juan-Alamo	17795	43743
San Angelo	16359	138924
San Antonio	61507	127999
Socorro	11702	76947
South San Antonio	10881	61229
Spring	17165	206217
United	10388	166402
Victoria	14159	186313
Waco	14024	157188
Weslaco	10709	50959
Wichita Falls	14895	165863
Ysleta	50209	80286

ENROLLMENT 3,000 TO 9,999 AND WEALTH ABOVE AVERAGE

Alamo Heights	3340	592674
Andrews	3771	609816
Angleton	6089	288449
Calhoun County	4252	412957
Carthage	3341	266128
Cedar Hill	4018	256070
College Station	5244	268589
Comal	5665	299227
Crowley	4995	300607
Deer Park	9326	536473
Dumas	3552	267949
Duncanville	9860	247720
Eagle Mountain-Saginaw	4581	305176
Eanes	4738	440567
Ft Stockton	3156	418812
Galveston	9965	238722
Grapevine-Colleyville	7085	433919
Highland Park	4020	1131808
Keller	6905	228173

Kerrville	3816	260802
La Marque	5124	249996
La Porte	7402	378964
Leander	4876	305621
Levelland	4109	267029
Mansfield	6821	243201
McKinney	4637	256139
Midway	4739	224793
Mount Pleasant	3748	230177
Pflugerville	5726	232626
Pine Tree	4594	295144
Port Neches	4973	233120
Rockwall	4277	285894
Sheldon	3955	366201
Sherman	5923	215279
Snyder	3532	237717
Texas City	6003	446448
Tomball	4465	260954
West Orange-Cove Consolidated	4221	354532

ENROLLMENT 3,000 TO 9,999 AND WEALTH BELOW AVERAGE

Alice	6142	74832
Allen	4663	196315
Alvin	9230	139348
Athens	3282	169336
Azle	4884	144484
Bastrop	4316	144707
Bay City	4779	183439
Beeville	4411	79472
Belton	4765	103458
Big Spring	4743	171882
Borger	3346	135675
Brenham	4417	174139
Brownwood	4074	139539
Burkburnett	3330	155626
Burleson	5194	160383
Calallen	4219	202964
Canutillo	3217	74469
Canyon	5673	161523
Channelview	5069	211093
Cleburne	5585	159279
Columbia-Brazoria	3701	168027
Copperas Cove	6126	79110
Corsicana	4869	157607
Crosby	3389	164525
Dayton	3209	131236
De Soto	5764	210799
Del Valle	5224	183411

Denison	4687	143048
Dickinson	5221	209561
Donna	6578	42509
Eagle Pass	9474	55922
East Central	5880	111395
Edcouch-Elsa	3810	22032
El Campo	3496	167122
Ennis	3986	150354
Everman	3422	183806
Four Bluff	4732	159785
Frenship	3817	103422
Friendswood	3199	179911
Georgetown	4834	193213
Granbury	4800	209715
Greenville	5018	177448
Gregory-Portland	3840	151589
Hays Consolidated	4063	138235
Henderson	3804	159589
Hereford	4618	105881
Huntsville	3678	129483
Jacksonville	3874	130777
Jasper	3543	96903
Joshua	3070	119678
Kilgore	3495	157573
Kingsville	5469	95191
La Joya	8572	63917
Lancaster	4270	201785
Little Cypress-Mauriceville	3452	131209
Livingston	3051	159154
Lockhart	3342	99164
Longview	8159	206346
Los Fresnos Consolidated	4260	69837
Lufkin	8153	169639
Magnolia	3232	144240
Marshall	6728	181832
Mercedes	4638	30039
Mineral Wells	3634	116004
Mission Consolidated	9569	39427
Nacogdoches	5834	163753
Nederland	4963	187033
New Braunfels	4991	161336
New Caney	5093	129159
Northwest	3011	212742
Palestine	4116	123218
Pampa	4476	163738
Paris	4209	125945
Pearland	6256	157538
Pecos-Barstow-Toyah	3652	168663
Plainview	6158	112368

Raymondville	3171	47903
Rio Grande City	6461	50162
Robstown	4512	48664
Roma	4736	37185
San Benito Consolidated	7663	45931
San Felipe-Del Rio Consolidated	8595	68509
San Marcos	6027	172506
Santa Fe	3865	109235
Schertz-Cibolo-Universal City	3989	156869
Seguin	6778	136250
Silsbee	3842	90878
Southwest	7327	63216
Sulphur Springs	3896	172795
Sweetwater	3055	113456
Temple	8124	174436
Terrell	3618	132439
Texarkana	5501	164473
Uvalde	4960	93850
Vidor	5715	90976
Waxahachie	4893	176389
Weatherford	5332	143426
White Settlement	3931	183775
Whitehouse	3109	149034
Wilmer-Hutchins	3870	124445

ENROLLMENT 1,000 TO 2,999 AND WEALTH ABOVE AVERAGE

Anahuac	1402	272072
Aransas County	2833	307317
Bandera	1383	329037
Barbers Hill	1696	926962
Bishop Consolidated	1362	354952
Boerne	2612	270351
Breckenridge	1909	272232
Bridgeport	1595	219354
Brownfield	2667	237413
Carroll	1792	353012
Coldspring-Oakhurst Consolidated	1655	254537
Coppell	2545	729999
Crane	1253	963847
Daingerfield-Lone Star	2126	374919
Denver City	2005	1139213
Dripping Springs	1428	222014
Fairfield	1553	372705
Fredericksburg	2249	235532
Freer	1120	251344
Frisco	1289	385723
George West	1257	322477
Giddings	1513	232867

Gladewater	2113	242910
Glen Rose	1342	3007830
Goliad	1259	352072
Groesbeck	1446	800723
Hallsville	2981	316878
Ingleside	1628	279783
Jourdanton	1172	320470
Kennedale	1590	259713
La Grange	1758	244279
Lake Dallas	1552	218682
Lake Travis	1608	655124
Llano	1234	675887
Malakoff	1076	295879
Manor	1323	368956
Marble Falls	2227	283246
Midlothian	2690	278243
Monahans-Wickett-Pyote	2872	267762
Montgomery	1691	383097
Mount Vernon	1150	264933
Palacios	1591	1442814
Perryton	1981	246368
Point Isabel	2102	483437
Post	1066	358764
Queen city	1189	250152
Quitman	1058	280949
Rains	1199	218441
Reagan County	1264	323751
Rockdale	1889	383317
Royal	1222	253569
Seminole	2217	1582360
Sonora	1082	417318
Spring Hill	1297	260969
Stafford Municiple	1458	493121
Sweeny	2167	412151
Tatum	1172	764639
Teague	1104	282314
Tuloso-Midway	2797	365689
Van	1656	228220
Van Vleck	1157	220850
Vernon Consolidated	2627	305755
West Rusk	1104	294971
White Oak	1277	600780
Willis	2761	224073
Zapata	2448	434085

ENROLLMENT 1,000 TO 2,999 AND WEALTH BELOW AVERAGE

Aledo	1733	146882
Alpine	1156	138207
Alvarado	2337	109774
Aransas Pass	2107	114127
Atlanta	2101	126495
Ballinger	1071	128199
Bellville	1635	187217
Bonham	1916	132371
Bowie	1754	126838
Boyd	1085	112329
Brady	1465	123743
Bridge City	2727	191449
Brooks	2040	209750
Brownsboro	1965	189392
Buna	1724	91915
Burnet Consolidated	2045	203603
Caldwell	1662	182288
Cameron	1712	99772
Canton	1516	134307
Carrizo Springs Consolidated	2543	96356
Castleberry	2788	121460
Center	2146	99443
Central	1207	76352
Chapel Hill	2906	128833
Childress	1242	95477
Clarksville	1568	102950
Cleveland	2809	132859
Clint	2782	78167
Clyde Consolidated	1357	105833
Coleman	1029	101037
Colorado	1354	192638
Columbus	1510	185432
Comanche	1136	134706
Commerce	1560	138815
Connally	2190	83972
Corrigan-Camden	1183	155777
Cotulla	1208	117045
Crockett	1872	119660
Crystal City	2116	61031
Cuero	1843	100571
Dalhart	1507	143097
Decatur	1585	196567
Dekalb	1032	80800
Devine	1646	87544
Diboll	2041	108545
Dimmitt	1689	124352
Early	1034	94128

Eastland	1094	144030
Edna	1669	165150
Elgin	2189	108328
Eustace	1025	199916
Fabens	2027	36709
Ferris	1370	100452
Floresville	2346	101756
Floydada	1294	104077
Forney	1498	159698
Friona	1287	131156
Gainesville	2681	148708
Gatesville	2090	103796
Gilmer	2131	134814
Gonzales	2699	109689
Graham	2649	181402
Greenwood	1299	136598
Hamshire-Fannett	1549	197385
Hardin	1096	135547
Hardin-Jefferson	1809	186630
Hearne	1772	95298
Hempstead	1142	164056
Hidalgo	2221	42751
Hillsboro	1670	127778
Hitchcock	1265	162380
Hondo	1830	99992
Hooks	1074	63636
Hudson	1621	78464
Huffman	2068	111892
Huntington	1281	77041
Iowa Park Consolidated	1888	149957
Jefferson	1579	195990
Jimm Hogg County	1298	196385
Karnes City	1022	147802
Kaufman	2611	101134
Kemp	1342	100180
Kenedy	1132	99891
Kermit	1803	207180
Kirbyville	1550	91689
Kountze	1277	117846
La Feria	2161	50370
La Vega	2195	89857
La Vernia	1111	113968
Lake Worth	1480	197648
Lamesa	2968	92807
Lampasas	2433	116513
Liberty	2355	146156
Liberty Hill	1010	134819
Liberty-Eylau	2768	89676
Lindale	2217	123222

Linden-Kildare Consolidated	1268	89887
Littlefield	1629	124061
Lorena	1020	84080
Lubbock-Cooper	1469	95658
Luling	1446	113015
Lumberton	2361	86827
Lyford	1470	105514
Mabank	2335	171868
Madisonville Consolidated	1719	146243
Marlin	1784	84820
Mathis	2191	72447
McGregor	1095	90536
Medina Valley	1924	142479
Merkel	1447	89147
Mexia	2339	87505
Mineola	1559	157918
Muleshoe	1667	106240
Navasota	2810	112869
Needville	1885	109762
New Boston	1633	82591
Newton	1644	99370
North Lamar	2573	135465
Odem-Edroy	1266	81310
Orange Grove	1203	65032
Orangefield	1346	113939
Pearsall	2413	79658
Pittsburg	2006	146666
Pleasant Grove	1909	117017
Pleasanton	2901	94778
Poteet	1521	59740
Prairiland	1024	82202
Princeton	1645	99777
Progresso	1440	25431
Quinlan	2462	117311
Red Oak	2999	138508
Rice Consolidated	1535	207323
Rio Hondo	1727	49309
River Road	1257	95445
Robinson	1771	83154
Roosevelt	1255	74567
Royse City	1145	115913
Rusk	1565	105779
Sabine	1171	173622
San Augustine	1250	78127
San Diego	1659	101078
San Elizario	1410	26061
Sanford	1432	104252
Sanger	1439	121502
Santa Rosa	1030	31872

Sealy	1839	155357
Sharyland	2639	82648
Shepherd	1345	103884
Sinton	2270	92936
Slaton	1768	88431
Smithville	1376	149405
Somerset	1951	52784
Southside	2731	60412
Splendora	1827	78745
Springtown	2348	92259
Stephenville	2977	202224
Taft	1660	95318
Tarkington	1380	135797
Taylor	2546	120344
Trinity	1178	185270
Troy	1063	80912
Tulia	1333	97579
Valley View	1107	32647
Waller	2620	176124
West	1187	109262
West Oso	1965	129488
Westwood	1747	94281
Wharton	2873	163738
Whitesboro	1143	151596
Whitney	1129	108417
Wills Point	2170	101532
Winnsboro	1276	139734
Woodville	1721	147219
Wylie (Collin County)	2411	206171
Wylie (Taylor County)	1667	209890
Yoakum	1606	124386

ENROLLMENT UNDER 1,000 AND WEALTH ABOVE AVERAGE

Abernathy	912	333501
Adrian	108	268581
Alanreed	28	781034
Allamoore Consolidated	3	6935633
Allison	70	2135896
Anderson-Shiro Condolidated	411	359720
Argyle	496	342024
Aspermont	398	366427
Austwell-Tivoli	215	1030574
Beckville	550	492725
Benjamin	59	875917
Blackwell Consolidated	156	714038
Blanco	625	221607
Bledsoe	57	1132725

Bluff Dale	67	375966
Boling	859	266443
Booker	356	437592
Borden county	203	1717835
Bremond	305	274558
Briscoe	82	1851353
Brookeland	228	448018
Bryson	271	253729
Buena Vista	177	791679
Burton	375	316145
Bushland	338	754677
Canadian	823	742037
Carbon	109	334282
Cayuga	558	279301
Centerville	515	557013
Channing	148	555835
Chico	513	355522
Chillicothe	282	358202
Chisum	605	241639
Christoval	285	270919
Comstock	118	378293
Cranfills Gap	130	234007
Crockett County Consolidated	927	466216
Cross Roads	516	256605
Culberson County	836	395874
Cushing	469	281497
Damon	141	284120
Darrouzett	73	1289661
Dawson	150	1209054
Devers	85	1136136
Dew	50	626386
Dime Box	237	353333
Divide	12	1318897
Doss Consolidated	23	431155
Driscoll	236	360303
Elysian Fields	947	238572
Etoile	91	227520
Evadale	374	775135
Ezzell	72	474756
Fayetteville	188	220192
Follett	165	565535
Forsan	530	523527
Franklin	682	374972
Ft. Hancock	366	225657
Garner	157	327735
Gause	73	220493
Glasscock	413	752744
Gordon	191	227650
Grady	207	688131

Graford	378	344864
Grandfalls-Royalty	238	329616
Grandview-Hopkins	26	2502425
Groom	213	268340
Gruver	537	393789
Guthrie Consolidated	98	3016991
Hallettsville	985	269046
Hallsburg	118	701708
Happy	220	215316
Harleton	510	246334
Harold	125	258409
Harper	246	306499
Hartley	127	275994
Hawkins	773	714189
Hermleigh	140	228496
Higgins	142	376525
High Island	237	301905
Highland	141	291779
Highland Park	707	1078310
Hobbs	26	1199141
Huckabay	132	311302
Hunt	112	905866
Industrial	831	317904
Ira	218	446223
Iraan-Sheffield	631	4241213
Iredell	106	263887
Irion County	360	615797
Jacksboro	937	270009
Jayton-Girard	193	3840031
Johnson City	510	264331
Juno Consolidated	7	4200823
Kelton	73	1310640
Kenedy County Wide Consolidated	63	3981283
Klondike	271	594396
Kopperl	186	222102
La Gloria	77	599458
La Poynor	398	426563
Lago Vista	436	709224
Laureles	22	4555934
Leakey	251	391556
Lefors	178	580786
Leggett	182	243297
Lela	39	317193
Leon	656	577352
Lingleville	171	218725
Loop	166	1430955
Lovejoy	428	485037
Lovelady	531	214509
Matagorda	117	652865

May	251	216531
McCamey	825	479193
McCaulley	59	598426
McDade	78	264393
McFaddin	12	2324515
McLean	242	254339
McMullen County	165	2308458
Medina	282	280841
Megargel	88	350800
Melissa	249	253730
Meyersville	146	296325
Miami	229	963020
Midway	177	332330
Mildred	334	280003
Mirando City	113	461686
Mobeetie	91	319689
Moran	108	286245
Morgan Mill	73	474422
Muenster	389	229887
Mumford	58	226715
Neches	222	281780
Newcastle	184	270979
Nordheim	122	291982
Normangee	420	346819
Novice	113	277432
Nueces Canyon Consoldiated	346	245255
Nursery	99	356028
Oakwood	350	250586
Onalaska	316	532342
Paint Creek	105	405021
Palo Pinto	46	1660139
Panhandle	711	350788
Patton Springs	112	230177
Pawnee	128	377880
Perrin-Whitt Consolidated	307	224739
Plains	507	1506307
Plemons-Stinnett-Phillips Consolidated	907	735378
Port Aransas	336	1355125
Pottsboro	976	226811
Pottsville	63	289224
Prairie Valley	107	269475
Pringle-Morse Consoldiated	76	1444397
Prosper	484	275082
Ramirez Consolidated	37	504726
Rankin	474	671424
Refugio	919	632917
Richards	126	264232
Robert Lee	350	344700
Round Top-Carmine	228	566855

Sabine Pass	190	1505531
Samnorwood	101	361799
San Isidro	381	323517
San Perlita	273	319348
Sands	251	274999
Santa Cruz	39	723240
Santa Gertrudis	83	2188293
Santo	335	255448
Savoy	251	294437
Schleicher	700	279514
Sierra Blanca	131	245614
Sivells Bend	53	631892
Smyer	342	238571
Somerville	646	267544
Spearman	847	297934
Spring Creek	34	995527
Sterling City	354	1054790
Stratford	542	398689
Strawn	131	270883
Sudan	400	1635426
Sundown	562	1463987
Sunnyvale	285	818266
Sunray	519	374262
Terlingua Consolidated	74	329040
Terrell County	352	439474
Texhoma	111	638090
Texline	181	242933
Three Rivers	766	354154
Three Way (Bailey County)	145	246161
Three Way (Erath County)	23	537088
Throckmorton	272	332140
Tidehaven	924	242861
Trent	183	222727
Union	80	405172
Utopia	166	399729
Valentine	70	310873
Veribest	149	287461
Vysehrad	51	931893
Waka	40	492117
Walcott	69	415369
Walnut Bend	41	391131
Webb Consolidated	246	2107316
Weimar	507	213874
Weinert	30	703398
Wellman	189	884303
Westbrook	185	973179
Westhoff	59	216228
Wheeler	437	289605
White Deer	542	394892

Whiteface Consolidated	281	1920481
Wildorado	60	266788
Wimberley	886	380195
Winfield	91	866749
Wingate	52	250917
Wink-Loving	437	1199789
Woodson	106	270525
Yantis	265	369801

ENROLLMENT UNDER 1,000 AND WEALTH BELOW AVERAGE

Abbott	184	107559
Academy	767	80589
Agua Dulce	402	153687
Alba-Golden	561	112587
Albany	564	188899
Alto	651	109451
Alvord	453	146663
Amherst	230	117332
Anna	473	112858
Anson	830	86650
Anthony	611	122393
Anton	338	142492
Apple Springs	227	154446
Aquilla	132	142304
Archer City	557	210486
Arp	828	108876
Asherton	419	51316
Aubrey	770	140142
Avalon	167	79174
Avery	358	80448
Avinger	234	103876
Axtell	671	58997
Baird	454	160819
Balmorhea	257	84200
Bangs	257	84200
Banquete	854	145727
Bartlett	204	98551
Bellevue	191	143860
Bells	536	88488
Ben Bolt-Palito Blanco	421	129389
Benavides	721	194189
Big Sandy	632	140461
Big Sandy	346	194656
Bland	340	104743
Blanket	179	81376
Bloomburg	243	74775

Blooming Grove	622	84452
Bloomington	856	114484
Blue Ridge	357	119069
Blum	244	151848
Boles Home	209	32136
Bosqueville	308	150288
Bovina	516	102524
Brackett	578	161977
Broaddus	364	149427
Brock	348	140155
Bronte	312	143061
Brookesmith	136	123940
Bruceville-Eddy	549	88975
Buckholts	135	108609
Buffalo	718	146415
Bullard	869	191768
Burkeville	416	211598
Byers	138	115246
Bynum	120	180742
Caddo Mills	686	119197
Callisburg	769	176571
Calvert	348	147642
Campbell	311	99092
Carlisle	346	120299
Celeste	410	81712
Celina	708	152612
Center Point	437	167728
Centerville	167	147037
Central Heights	470	81248
Chapel Hill	194	104719
Charlotte	503	103121
Cherokee	119	155347
Chester	264	167320
Chilton	385	75533
China Spring	896	104005
Chireno	246	96125
Cisco	892	119376
City View	743	132541
Clarendon	557	144122
Claude	387	180568
Clifton	877	192842
Coahoma	925	185920
Collinsville	362	102608
Colmesneil	377	199163
Comfort	830	188041
Community	847	95950
Como-Pickton	542	155617
Coolidge	236	98913
Cooper	763	107013

Cotton Center	162	184568
Coupland	105	181918
Covington	203	76140
Crandall	991	97179
Crawford	349	111038
Crosbyton	694	108718
Cross Plains	462	136108
Crowell	349	177505
Cumby	234	149123
D'Hanis	252	158988
Danbury	577	160773
Dawson	384	110379
De Leon	705	156735
Dell City	241	171417
Detroit	395	83571
Deweyville	715	125209
Dilley	909	90161
Dodd City	185	75523
Douglass	206	177609
Dublin	991	150043
East Bernard	850	151878
East Chambers	993	164882
Ector	128	100341
Eden Consolidated	394	168434
Edgewood	722	150606
Electra	589	209153
Elkhart	861	117923
Era	320	112460
Eula	445	176726
Evant	256	131917
Excelsior	60	95645
Falls City	301	143616
Fannindel	269	114358
Farmersville	949	125407
Farwell	519	136947
Flatonia	470	205994
Florence	609	93663
Forestburg	136	134162
Frankston	740	174712
Frost	330	74826
Fruitvale	296	128345
Ft. Davis	312	203815
Ganado	649	189783
Garrison	644	109276
Gary	243	201337
Gholson	149	91528
Godley	681	97107
Gold Burg	134	197566
Goldthwaite	543	124098

Goodrich	291	187062
Goree	112	110584
Gorman	344	144272
Grand Saline	901	129180
Grandview	736	112720
Granger	293	133533
Grape Creek-Pulliam	702	138011
Grapeland	847	175071
Groveton	770	199812
Gunter	361	80501
Gustine	172	132623
Hale Center	756	90293
Hamilton	722	178325
Hamlin	717	142488
Harmony	665	186912
Hart	573	91879
Harts Bluff	351	100814
Haskell	708	103565
Hawley	642	80049
Hedley	95	203119
Hemphill	900	205587
Henrietta	955	155566
Hico	452	113785
Holiday	779	149966
Holland	426	74741
Honey Grove Consolidated	576	120604
Howe	838	87349
Hubbard (Bowie County)	59	129350
Hubbard (Hill County)	466	75393
Hughes Springs	928	187173
Hull-Daisetta	783	186881
Hutto	559	162271
Idalou	841	112823
Ingram	995	161742
Iola	364	191294
Italy	572	76124
Itasca	546	99873
Jarrell	331	132475
Jim Ned Consolidated	731	157975
Joaquin	600	122005
Jonesboro	225	101631
Junction	766	132578
Karnack	475	166393
Keene	506	147677
Kendleton	151	127781
Kennard	453	144726
Kerens	701	129284
Knippa	179	110555
Knox City-O'Brien	462	120312

Kress	357	133528
Krum	770	110073
La Pryor	515	75781
La Villa	673	63103
Lakeview	103	198687
Laneville	406	113386
Lasara	248	99952
Latexo	362	206125
Lazbuddie	247	172118
Leary	147	76364
Leonard	579	90720
Leveretts Chapel	244	138108
Lexington	790	117247
Lindsay	417	152087
Lipan	207	178066
Little Elm	957	143416
Lockney	730	101759
Lohn	106	131721
Lometa	252	114118
London	141	174514
Lone Oak	484	119762
Loraine	218	112141
Lorenzo	470	142532
Louise	436	210374
Lueders-Avoca	206	155645
Lytle	927	66296
Malone	63	184624
Malta	66	110283
Marathon	167	182742
Marfa	581	120915
Marietta	89	109139
Marion	840	114676
Mart	681	76487
Martins Mill	271	133332
Mason	627	187912
Matinsville	175	107626
Maud	417	59330
Maydelle	180	127280
Maypearl	491	108443
McLeod	196	87511
Meadow	265	157244
Memphis	560	100075
Menard	409	213151
Meridian	421	142154
Milano	337	134375
Miles	386	86901
Milford	214	103308
Miller Grove	211	133854
Millsap	570	112535

Montague	78	134926
Monte Alto	458	69919
Moody	622	84362
Morgan	159	186373
Morton	825	75014
Motley County	275	183460
Moulton	297	127724
Mount Calm	114	116983
Mount Enterprise	352	88800
Mullin	114	197000
Munday	430	69079
Murchison	147	181716
Natalia	769	64372
Navarro	543	179253
Nazareth	242	72293
New Deal	598	118605
New Diana	699	65206
New Home	186	131927
New Summerfield	262	85655
New Waverly	781	109311
Nixon-Smiley Consolidated	905	96761
Nocona	723	142524
North Hopkins	344	192490
North Zulch	196	198560
Northside	99	147707
O'Donnell	424	142051
Oglesby	160	89590
Olfen	54	88192
Olney	814	142615
Olton	807	99538
Ore City	799	102655
Overton	431	96158
Paducah	468	162634
Paint Rock	162	213046
Palmer	672	116742
Panther Creek Consolidated	254	199528
Paradise	555	204078
Peaster	439	96988
Penelope	127	85975
Petersburg	410	101300
Petrolia	438	87929
Pettus	437	194367
Pewitt	992	113131
Pilot Point	868	180751
Ponder	368	144398
Poolville	210	175474
Poth	669	116258
Prairie Lea	203	176071
Premont	964	175691

Presidio	971	55469
Priddy	92	99367
Quanah	849	179644
Ralls	722	104118
Ranger	693	135109
Red Lick	241	127690
Redwater	800	70922
Ricardo	515	116392
Rice	244	119620
Richland Springs	154	187768
Riesel	428	114696
Rio Vista	690	80877
Rising Star	209	127696
Riviera	450	210606
Roby	334	98785
Rochelle	259	114599
Rochester	173	158592
Rocksprings	482	207264
Rogers	755	85832
Ropes	315	128341
Roscoe	463	105706
Rosebud-Lott	862	89661
Rotan	511	159222
Roxton	197	107741
Rule	201	165841
Runge	351	113477
S and S Consolidated	733	175569
Sabinal	538	130157
Saint Jo	308	169403
Salado	536	206602
Saltillo	196	134303
Sam Rayburn	350	104736
San Saba	793	128245
San Vicente	30	158144
Santa Anna	370	114505
Santa Maria	394	42782
Schulenburg	691	181507
Scurry-Rosser	688	83016
Seagraves	721	156083
Seymour	737	193843
Shallowater	898	76381
Shamrock	524	137658
Shelbyville	615	90341
Shiner	535	133150
Sidney	156	78985
Silverton	238	160708
Simms	479	95920
Skidmore-Tynan	614	121787
Slidell	244	133342

Slocum	290	158992
Snook	549	186110
Southland	171	192660
Spade	104	130577
Springlake-Earth	579	114138
Spur	472	128149
Spurger	342	96576
Stamford	878	89259
Stanton	891	187117
Star	63	183912
Stockdale	645	113647
Sulphur Bluff	214	186686
Sweet Home	93	168983
Tahoka	709	103093
Talco-Bogata Consolidated	736	133206
Tenaha	392	76526
Thorndale	409	178219
Thrall	485	107530
Timpson	616	101197
Tioga	117	166811
Tolar	328	114753
Tom Bean	685	79736
Tornillo	361	56083
Trenton	331	94599
Trinidad	233	192799
Troup	819	113805
Turkey-Quitaque	312	111813
Union Grove	625	142575
Union Hill	321	108850
Valley Mills	486	161450
Valley View	526	88961
Van Alstyne	745	123495
Vega	341	147562
Venus	916	63375
Waelder	219	164849
Wall	684	148165
Wallis-Orchard	786	202981
Walnut Springs	193	134946
Warren	881	181873
Waskom	845	201322
Water Valley	335	188326
Wellington	625	114119
Wells	326	80838
West Hardin County Consolidated	689	174970
West Sabine	591	130877
Westminster	193	86910
Westphalia	87	79730
Whitewright	543	109801
Whitharral	181	145868

Wilson	230	174472
Windthorst	294	104502
Winona	908	186058
Winters	894	132895
Woden	599	66491
Wolfe City	553	102772
Woodsboro	731	155848
Wortham	389	135611
Yorktown	797	119151
Zavalla	368	139790
Zephyr	153	86457

*Wealth in dollars per child

APPENDIX B

SURVEY SAMPLE

STRATIFIED SELECTION BY RANDOM SAMPLING

District Name	CASE #	Enrollment	Wealth*
ENROLLMENT OVER 10,000 AND WEALTH ABOVE AVERAGE			
Alief	001	26893	215501
Arlington	002	42153	309359
Beaumont	003	20641	239893
Birdville	004	17583	231921
Carrollton-Farmers Branch	005	16058	554034
Clear Creek	006	20694	269693
Cypress-Fairbanks	007	36324	248339
Denton	008	10147	272246
Goose Creek	009	16803	283668
Hurst-Euless-Bedford	010	17825	276359
Lamar Consolidated	011	11534	233526
North East	012	39087	316122
Northside	013	48528	221872
Plano	014	28724	404063
Round Rock	015	18138	225107
ENROLLMENT OVER 10,000 AND WEALTH BELOW AVERAGE			
Amarillo	016	27307	159566
Brownsville	017	35898	53470
Bryan	018	11047	167368
Ector County	019	26258	183904
Edinburg	020	14709	87704
El Paso	021	63169	123262
Grand Prairie	022	16299	157212
Harlandale	023	14941	59945
Killeen	024	22892	75916
Lubbock	025	30953	149943
Pharr-San Juan-Alamo	026	17795	43743
San Angelo	027	16359	138924
South San Antonio	028	10881	61229
Waco	029	14024	157188
Weslaco	030	10709	50959
ENROLLMENT 3,000 TO 9,999 AND WEALTH ABOVE AVERAGE			
Calhoun County	031	4252	412957
Carthage	032	3341	266128
Cedar Hill	033	4018	256070
Deer Park	034	9326	536473
Dumas	035	3552	267949

Eanes	036	4738	440567
Grapevine-Colleyville	037	7085	433919
Kerrville	038	3816	260802
La Porte	039	7402	378964
Levelland	040	4109	267029
Pflugerville	041	5726	232626
Port Neches	042	4973	233120
Sherman	043	5923	215279
Snyder	044	3532	237717
Tomball	045	4465	260954

ENROLLMENT 3,000 TO 9,999 AND WEALTH BELOW AVERAGE

Azle	046	4884	144484
Borger	047	3346	135675
Burkburnett	048	3330	155626
Copperas Cove	049	6126	79110
Dickinson	050	5221	209561
Ennis	051	3986	150354
Four Bluff	052	4732	159785
Greenville	053	5018	177448
Jasper	054	3543	96903
Longview	055	8159	206346
Nederland	056	4963	187033
Pecos-Barstow-Toyah	057	3652	168663
San Felipe-Del Rio Consolidated	058	8595	68509
Seguin	059	6778	136250
Texarkana	060	5501	164473

ENROLLMENT 1,000 TO 2,999 AND WEALTH ABOVE AVERAGE

Anahuac	061	1402	272072
Bishop Consolidated	062	1362	354952
Carroll	063	1792	353012
Coldspring-Oakhurst Consolidated	064	1655	254537
Daingerfield-Lone Star	065	2126	374919
Fredericksburg	066	2249	235532
Giddings	067	1513	232867
Goliad	068	1259	352072
Jourdanton	069	1172	320470
Malakoff	070	1076	295879
Manor	071	1323	368956
Marble Falls	072	2227	283246
Palacios	073	1591	1442814
Reagan County	074	1264	323751
Teague	075	1104	282314

ENROLLMENT 1,000 TO 2,999 AND WEALTH BELOW AVERAGE

Atlanta	076	2101	126495
Caldwell	077	1662	182288
Clyde Consolidated	078	1357	105833
Dalhart	079	1507	143097
Ferris	080	1370	100452
Hardin	081	1096	135547
Iowa Park Consolidated	082	1888	149957
La Vernia	083	1111	113968
Luling	084	1446	113015
Muleshoe	085	1667	106240
Pleasanton	086	2901	94778
Royse City	087	1145	115913
Sinton	088	2270	92936
Troy	089	1063	80912
Woodville	090	1721	147219

ENROLLMENT UNDER 1,000 AND WEALTH ABOVE AVERAGE

Alanreed	091	28	781034
Borden county	092	203	1717835
Chisum	093	605	241639
Doss Consolidated	094	23	431155
Grady	095	207	688131
Hermleigh	096	140	228496
Johnson City	097	510	264331
Lingleville	098	171	218725
Meyersville	099	146	296325
Nueces Canyon Consoldiated	100	346	245255
Prairie Valley	101	107	269475
Santa Gertrudis	102	83	2188293
Sunnyvale	103	285	818266
Veribest	104	149	287461
Wimberley	105	886	380195

ENROLLMENT UNDER 1,000 AND WEALTH BELOW AVERAGE

Albany	106	564	188899
Benavides	107	721	194189
Callisburg	108	769	176571
Como-Pickton	109	542	155617
Eden Consolidated	110	394	168434
Goodrich	111	291	187062
Howe	112	838	87349
La Villa	113	673	63103

Marfa	114	581	120915
Moulton	115	297	127724
Paducah	116	468	162634
Richland Springs	117	154	187768
Santa Maria	118	394	42782
Sweet Home	119	93	168983
Warren	120	881	181873

*Wealth in dollars per child

APPENDIX C

SURVEY LETTERS

«data b:survlist»
«first» «last»
«district» Independent School District
«address»
«city», Texas «zip»

Dear Sir:

Senate Bill 1019 and subsequent legislation have addressed the issue of state participation in the funding of public school facilities. However, before state participation becomes an on-going segment of school finance legislation several things must occur. First, standards against which school facilities will be measured must be determined; and secondly, an inventory system must be developed.

This survey is intended to support the efforts of the Texas Education Agency in the development of standards for selected academic spaces in educational facilities. As stated by the Commissioner, standards are a very important prerequisite to state participation in facilities funding.

Please lend your assistance in this endeavor by completing the enclosed survey by May 15, 1990. Your participation will be very much appreciated.

Thank you for your time and support.

Sincerely,

Jack Seals
Cooperative Superintendency Fellow,
University of Texas at Austin
and the Texas Education Agency

«data b:survlist»
«first» «last»
«district» Independent School District
«address»
«city», Texas «zip»

Dear Sir:

Approximately three weeks ago, selected school superintendents in Texas were asked to participate in a study regarding square footages needed for an adequate education in selected educational spaces. I have not, however, received a completed survey from you.

This survey is attempting to gain the professional perspectives of superintendents concerning the space requirements needed for the adequate education of students in Texas schools. The results of this study should be of use to the Texas Education Agency as it strives to meet the requirements of Senate Bill 1019 relating to the development of facilities standards.

To date, a number of surveys have been returned by your superintendent colleagues across Texas. In order to complete this study, your participation is also needed. An additional copy of the questionnaire is enclosed.

Please complete and return the survey within seven (7) working days. A postage paid return envelope is included for your convenience. If you have completed and returned the survey, disregard this second request. Again, your participation is appreciated and important to successful completion of this study.

Sincerely,

Jack Seals
Cooperative Superintendency Fellow,
University of Texas at Austin
and the Texas Education Agency

APPENDIX D

COMMISSIONER'S LETTER

Texas
Education
Agency
1701 NORTH CONGRESS AVENUE AUSTIN, TEXAS 78701-1494 (512) 463-9734

April 27, 1990

Jack Seals
Cooperative Superintendency Fellow
The University of Texas
EDB 310
Austin, Texas 78712

Dear Jack:

Thank you for your interest in the efforts of the Texas Education Agency related to facility standards. The agency is currently under state mandate to oversee the development of facility standards, as outlined in Senate Bill 1019. The study you are undertaking is certainly of interest to us. The standards by which future school buildings may be judged rest in the standards which are developed by the agency and accepted by the legislature.

I know that superintendents across the state will be willing to assist you in your efforts by completing the survey which you have developed. Input from practicing superintendents, concerning the space requirements needed for the adequate education of students in Texas schools, will be of interest to our work here as well. I appreciate you offering to share this valuable information with us upon completion of your study. This data will assist us in making recommendations for standards in the public school arena. These standards, of course, are an extremely important prerequisite to state participation in the funding of educational facilities.

I encourage all superintendents who are afforded the opportunity to actively participate in this worthwhile effort to do so. Good luck in this important study.

Sincerely,

W. N. Kirby
Commissioner of Education

APPENDIX E

SURVEY FORM

Dear Superintendent:

This survey is being undertaken to gain the professional judgement of superintendents regarding square footage per pupil needs of students in Texas schools. Under Senate Bill 1019, the determination of standards for educational space is a very important prerequisite to state participation in facilities funding. The information you provide will be critical in developing a recommendation for standards for educational space in Texas. If you elect to delegate this task to a staff member, please indicate that you have reviewed the survey by personally signing the form.

You are being asked to:

1. Review the grade level or program area given in column A and the range given for "average class enrollment" in column B. Enter your professional judgment (please enter a single number - not a range) on the blank line in column C for the total classroom size needed to provide an adequate education.
2. On the blank line in column D adjacent to your recommendation, enter a very brief description of the factors you considered when making your recommendation.
3. Answer the two informational questions at the end of the survey.
4. Sign the form on the line provided at the bottom of the page and return.

Thank you for giving your prompt attention to this survey.

COLUMN A Grade Level or Program Area	COLUMN B Average Class Enrollment	COLUMN C Your Recommendation: Total Square Feet Per Classroom	COLUMN D Factors Considered In Your Recommendation
ELEMENTARY SCHOOLS			
General Classroom			
Prekindergarten	20-25		
Kindergarten	20-26		
Grades 1 - 4	20-24		
Grades 5 - 6	24-26		
Laboratories			
Arts/Crafts	25-27		
Music	25-27		
MIDDLE SCHOOLS & JUNIOR HIGH SCHOOLS (Grades 6-7-8; 7 - 8; 7-8-9)			
General Classrooms			
Grades 6 - 9	25-27		
Laboratories (In Classroom Setting)			
Science	29-30		
Art	25-28		
Choral Music	28-32		
Instrumental Music	28-32		
Vocational/Industrial Technology			
Homemaking Lab	24-28		

(OVER)

COLUMN A Grade Level or Program Area	COLUMN B Average Class Enrollment	COLUMN C Your Recommendation: Total Square Feet Per Classroom	COLUMN D Factors Considered In Your Recommendation
HIGH SCHOOLS (Grades 9-12)			
General Classroom			
Grades 9-12	25-28	______	______________
Shops/Labs			
Science			
Physical Science	25-28	______	______________
Biology	25-28	______	______________
Chemistry	25-28	______	______________
Physics	25-28	______	______________
Art	28-29	______	______________
Choral Music	45-65	______	______________
Instrumental Music	50-75	______	______________
Vocational/Industrial Technology and Business			
Shops/Labs			
Home Economics	24-28	______	______________
General Agriculture Shop	18-22	______	______________
Typing/Word Processing	24-25	______	______________
SPECIAL EDUCATION CLASSROOMS (All Grade Levels)			
Educable Mentally Retarded	5-18	______	______________
Trainable Mentally Retarded	10-18	______	______________
Severe & Profound	3-18	______	______________
Physically Handicapped	5-18	______	______________
Emotionally Disturbed	5-18	______	______________
Gifted and Talented	6-15	______	______________

How many years of experience do you have as superintendent? ______

As an administrator, have you ever participated in planning the instructional space for a school building? ______

____

Superintendent's Signature

Return to:

Texas Education Agency
Attn. Jack Seals
Room 5-100
1701 North Congress
Austin, Texas 78701

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